OPTONICA SERVICE MANUAL

APSS
Auto Program Search System

DOLBY SYSTEM ®

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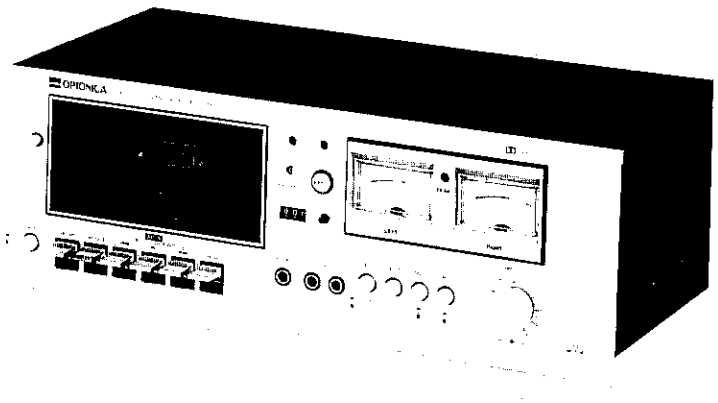

(PHOTO : RT-1616H)

STEREO CASSETTE
TAPE DECK

MODEL
RT-1616H
(Silver Panel)
RT-1616HB
(Black Panel)
RT-1616HW
(With Decorative Plates)

In the interests of user-safety the set should be restored to its original condition and only parts identical to those specified be used.

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SHARP CORPORATION OSAKA, JAPAN

SPECIFICATIONS

Type:	4-track 2-channel stereo cassette tape recorder/player deck with built-in Dolby noise reduction system
Power source:	AC110/220/240V, 50/60Hz
Power consumption:	13W
Semiconductors:	4-IC 23-Transistor 15-Diode 3-LED
Dimensions:	Width: 442 mm (17-3/8") Height: 158 mm (6-1/4") Depth: 252 mm (9-15/16")
Weight:	RT-1616H, RT-1616HB; 6.0 kg (13.2 lbs) RT-1616HW; 6.5 kg (14.3 lbs)
Input circuitry:	Microphone jacks, 6.8K ohms Line input jacks, 50K ohms Record/playback socket, 6.8K ohms
Output circuitry:	Headphones jack, 8 ohm Line output jacks, 50K ohms Record/playback socket, 50K ohms
Tape:	Philips standard compact cassette tape
Tape speed:	4.8 cm/sec. (1-7/8 ips.)
Recording system:	AC bias system (85 kHz)
Erasing system:	AC erasing
Fast forward & rewind time:	100 seconds (C-60)
Wow and flutter:	0.18% (DIN 45 500) 0.07% WRMS
Frequency response:	Normal tape; 40 – 12,500 Hz (SHARP C-60UD) (DIN 45 500) 40 – 12,500 Hz ± 3 dB MAXELL C-60UDXL II tape; 40 – 14,000 Hz (DIN 45 500) 40 – 14,000 Hz ± 3 dB
Signal to noise ratio:	52 dB, For normal tape, at LINE-IN, without Dolby N.R. system
Dolby N.R. effect:	10 dB (at over 5 kHz)
Distortion:	1.5%
Channel separation:	35 dB
Erase ratio:	65 dB
Input sensitivity and input impedance:	Microphone: 0.2 mV, 6.8K ohms Record/playback socket: 0.2 mV, 6.8K ohms Line in: 63 mV, 50K ohms
Output level and loaded impedance:	Headphones: 63 mV ("0" VU), 8 ohms Record/playback socket: 500 mV ("0" VU), 50K ohms Line out: 500 mV ("0" VU), 50K ohms

Specifications are subject to change without prior notice.

LAYOUT OF FRONT AND REAR PARTS (Refer to Figure 3–1 and Figure 3–2)

1. Cassette chamber lid opener button
   (JKNBP0076AFSC) (RT-1616H, RT-1616HW)
   (JKNBP0076AFSD) (RT-1616HB)
2. Cassette chamber (GDORF3053AFSA)
3. Digital tape counter (KCOUB0072AFZZ)
4. Tape counter reset button (KCOUB0072AFZZ)
5. Record indicator, D603 (VHPGL-52AR/1F)
6. Dolby N.R. indicator, D602 (VHPGL-52AR/1F)
7. APSS indicator cover
   (HDECQ0056AFSA) (RT-1616H, RT-1616HW)
   (HDECQ0056AFSB) (RT-1616HB)
8. Level meters, ME101 & ME201 (RMTRL0176AFZZ)
9. Peak level indicator, D601 (VHPGL-52AR/1F)
10. Power switch knob
    (JKNBM1004SESF) (RT-1616H, RT-1616HW)
    (JKNBM1004SESI) (RY-1616HB)
11. Pause key
    (JKNBR0110AFSE) (RT-1616H, RT-1616HW)
    (JKNBR0110AFSA) (RT-1616HB)
12. Record key
    (JKNBR0110AFSF) (RT-1616H, RT-1616HW)
    (JKNBR0110AFSB) (RT-1616HB)
13. Rewind/Reverse APSS key
    (JKNBR0110AFSE) (RT-1616H, RT-1616HW)
    (JKNBR0110AFSA) (RT-1616HB)
14. Play key (JKNBR0110AFSE) (RT-1616H, RT-1616HW)
    (JKNBR0110AFSA) (RT-1616HB)
15. Fast-forward/Forward APSS key
    (JKNBR0110AFSE) (RT-1616H, RT-1616HW)
    (JKNBR0110AFSA) (RT-1616HB)
16. Stop key
    (JKNBR0110AFSE) (RT-1616H, RT-1616HW)
    (JKNBR0110AFSA) (RT-1616HB)
17. Headphones jack, J4 (QJAKJ0055AFZZ)
18. Microphone jacks, J1 & J2 (QJAKZ0062AFZZ)
19. Input selector switch knob
    (JKNBM1004SESF) (RT-1616H, RT-1616HW)
    (JKNBM1004SESI) (RT-1616HB)
20. Dolby N.R. switch knob
    (JKNBM1004SESF) (RT-1616H, RT-1616HW)
    (JKNBM1004SESI) (RT-1616HB)
21. Bias selector switch knob
    (JKNBM1004SESF) (RT-1616H, RT-1616HW)
    (JKNBM1004SESI) (RT-1616HB)
22. Equalizer selector switch knob
    (JKNBM1004SESF) (RT-1616H, RT-1616HW)
    (JKNBM1004SESI) (RT-1616HB)
23. Record level control knobs
    (JKNBK0169AFSA & JKNBN0366AFSA)
    (RT-1616H, RT-1616HW)
    (JKNBK0169AFSC & JKNBN0366AFSD)
    (RT-1616HB)
24. Input jacks, J3A & J3B (QSOCZ2463AFZZ)
25. Record/playback socket (5-pin, DIN), J3E
    (QSOCZ2463AFZZ)
26. Output jacks, J3C & J3D (QSOCZ2463AFZZ)
27. Mains voltage selector, SO501 (QSOCE0410AGZZ)
28. Mains supply cord

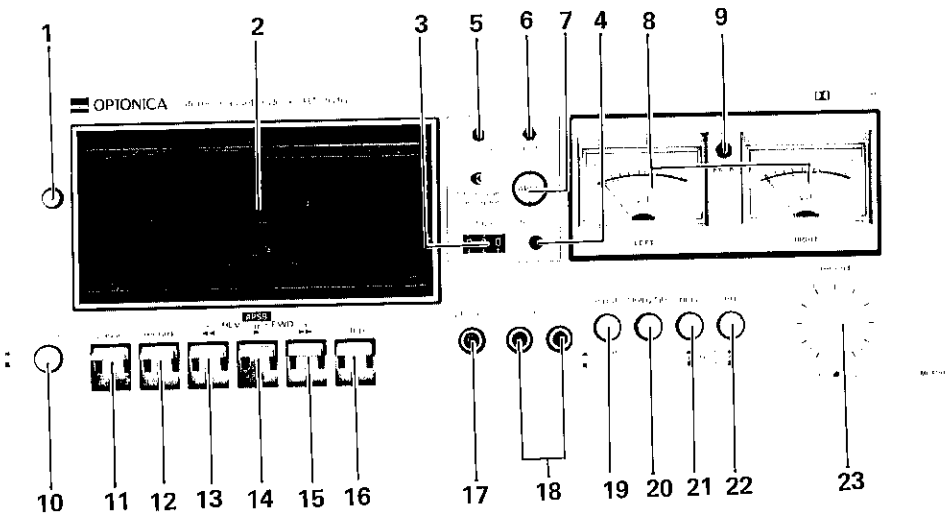


Figure 3–1

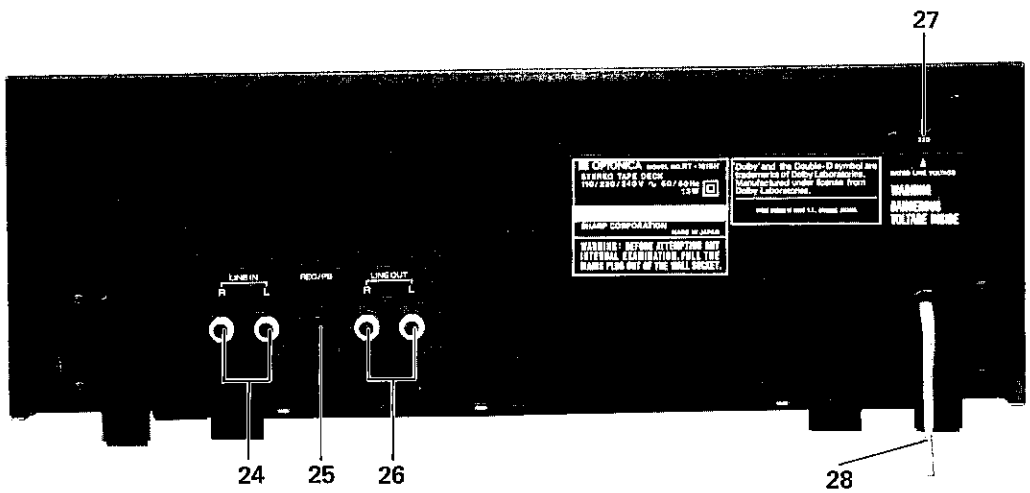


Figure 3–2

MAINS VOLTAGE SELECTION

Check the preset voltage selector before connecting the mains plug to a mains outlet.
If the setting is different from that of your local mains supply voltage, the selector must be re-set as follows. Rotate the voltage selector by using a screwdriver so that your local voltage number can be seen.

Note for users in UK
IMPORTANT:
The wires in the mains lead of this apparatus are coloured in accordance with the following code:
BLUE: "NEUTRAL"
BROWN: "LIVE"
CONNECTING PLUG TO MAINS LEAD:
As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

* The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.
* The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

This apparatus must be protected by a 3A fuse in the mains plug or distribution board.
This equipment leaves the factory adjusted for use on a 240 Volt (50 Hz) mains supply.

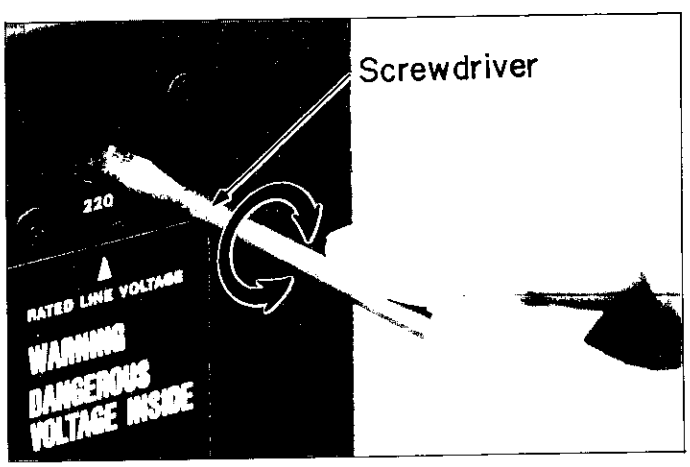


Figure 3–3

DISASSEMBLY

CABINET REMOVAL (RT-1616H and RT-1616HB)

1. Remove the eight screws retaining the cabinet at the right and left surfaces. (Refer to Figure 4–1)
2. Giving a force to the bottom of cabinet, hold it up and remove. (Refer to Figure 4–2)

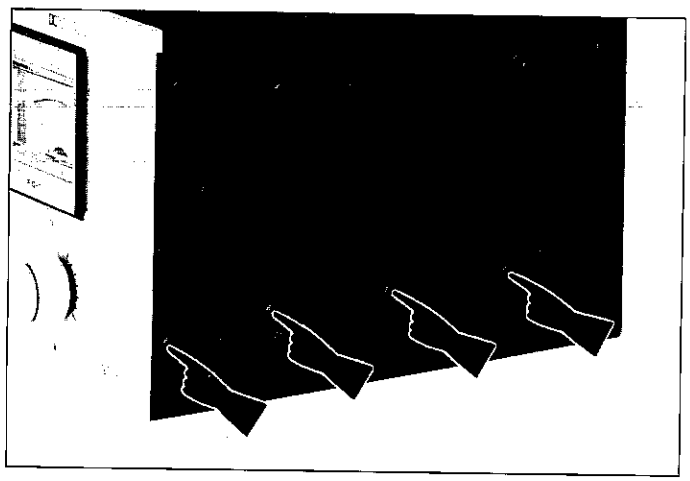


Figure 4–1

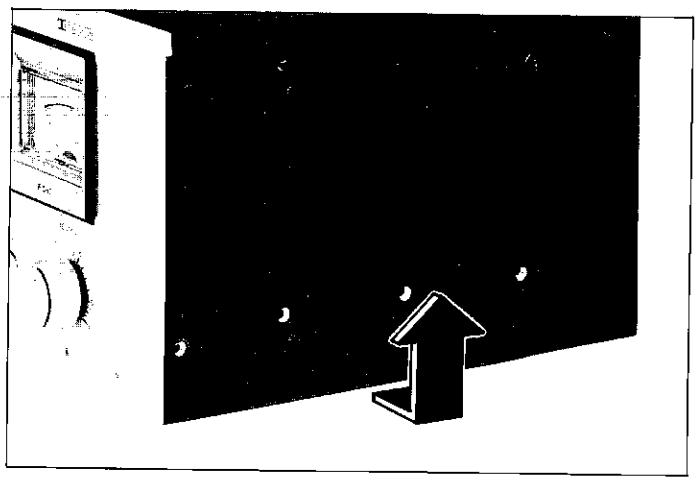


Figure 4–2

DISASSEMBLY

CABINET REMOVAL (RT-1616HW)

1. Remove the eight screws retaining the decorative plates (wooden) one each at the right and left surfaces of the cabinet. (Refer to Figure 4–3)
2. Remove the four screws retaining the cabinet at the right and left surfaces. (Refer to Figure 4–4)
3. Giving a force to the bottom of cabinet, hold it up and remove. (Refer to Figure 4–5)

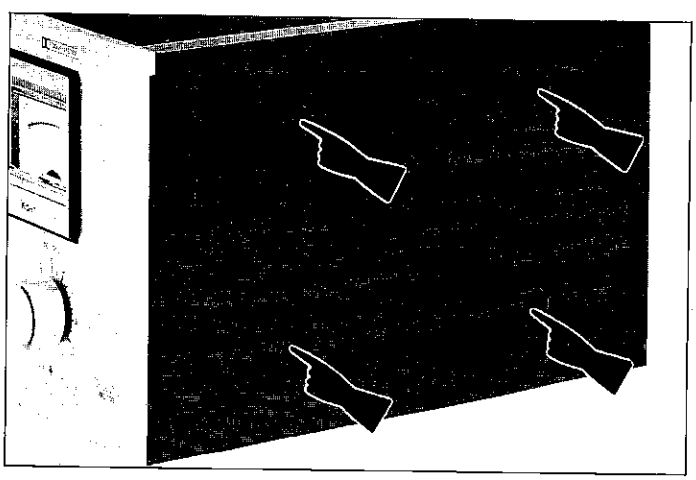


Figure 4–3

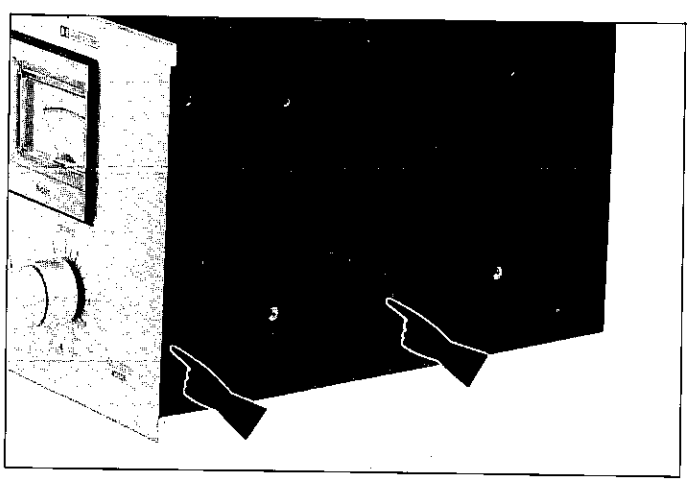


Figure 4–4

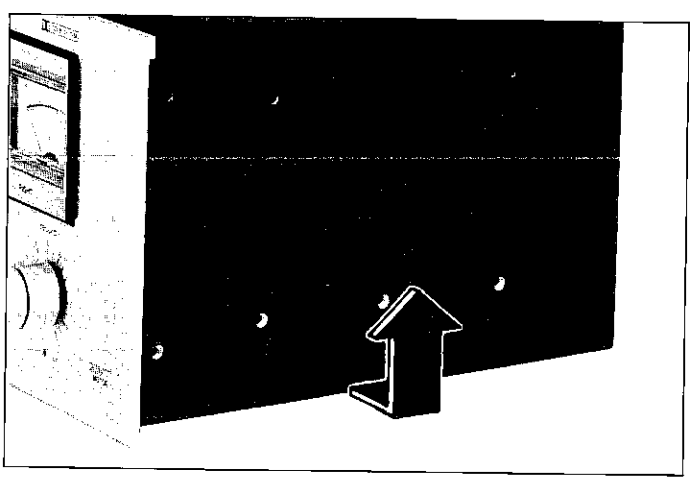


Figure 4–5

BOTTOM LID REMOVAL

1. Turn the set over and remove the six screws retaining the bottom lid and those two fixing the legs. (Refer to Figure 5–1)
2. Shift the bottom lid backward and remove. (Refer to Figure 5–2)

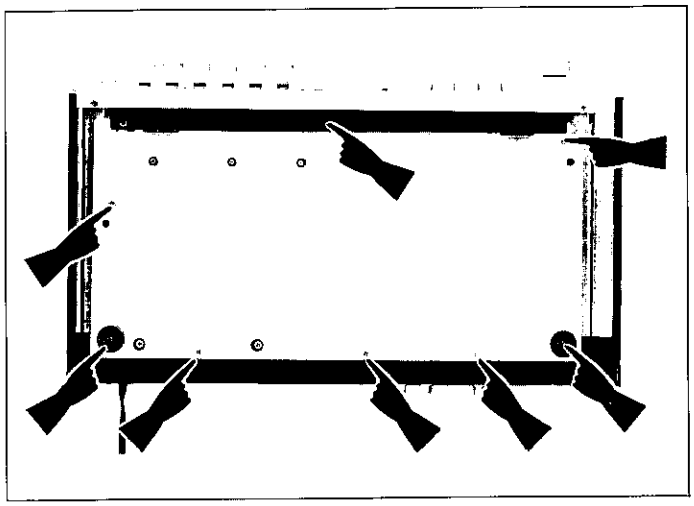


Figure 5–1

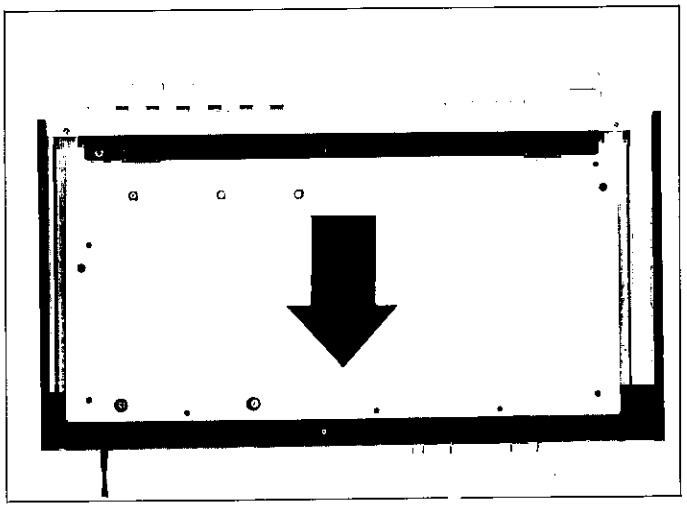


Figure 5–2

FRONT PANEL REMOVAL

1. Remove the cabinet in reference to "CABINET REMOVAL"
2. Pull out the two record level control knobs. (Refer to Figure 5–3)
3. Remove the two screws retaining the front panel (at its lower part). (Refer to Figure 5–3)
4. Unlock the three locked parts of the front panel (at its upper side) and withdraw the front panel and remove. (Refer to Figure 5–4)

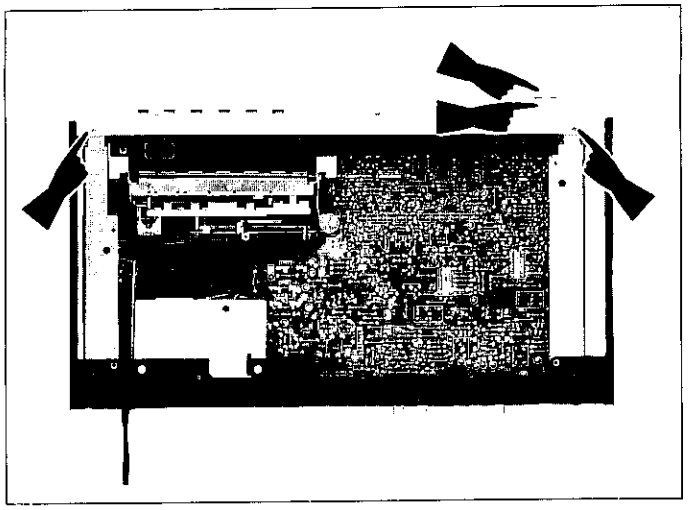


Figure 5–3

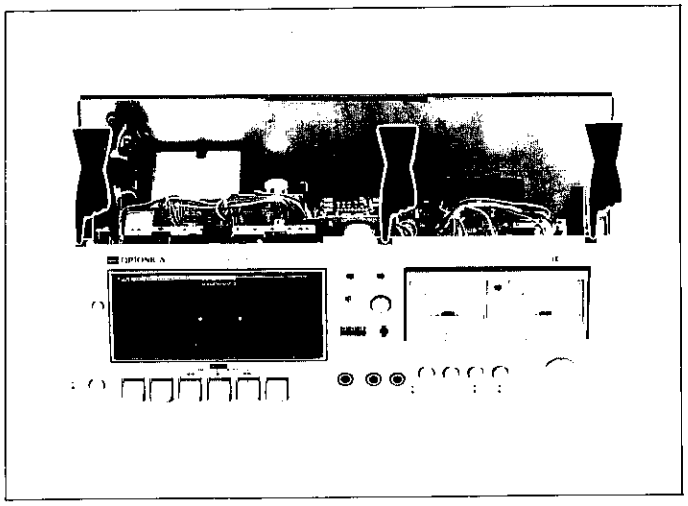


Figure 5–4

MECHANISM BLOCK REMOVAL

1. Remove the cabinet, bottom lid and front panel referring to "CABINET REMOVAL", "BOTTOM LID REMOVAL" and "FRONT PANEL REMOVAL" respectively.
2. Remove the spring connecting the record/playback switch and lever with each other. (Refer to Figure 6–1)
3. Pull out the five wiring lead tips and two wiring connecting sockets provided on the printed wiring board. (Refer to Figure 6–2)
4. Detach the counter belt from the counter pulley. (Refer to Figure 6–3)
5. Remove the three screws retaining the mechanism block, shift the mechanism block backward and remove by holding it up. (Refer to Figure 6–4, Figure 6–5 and Figure 6–6)

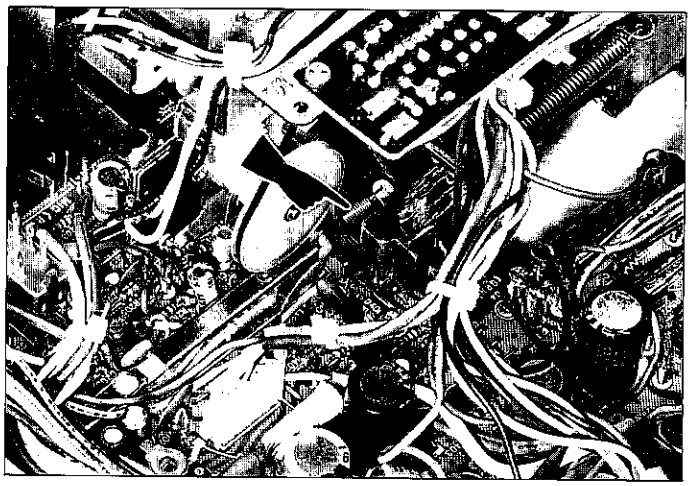


Figure 6–1

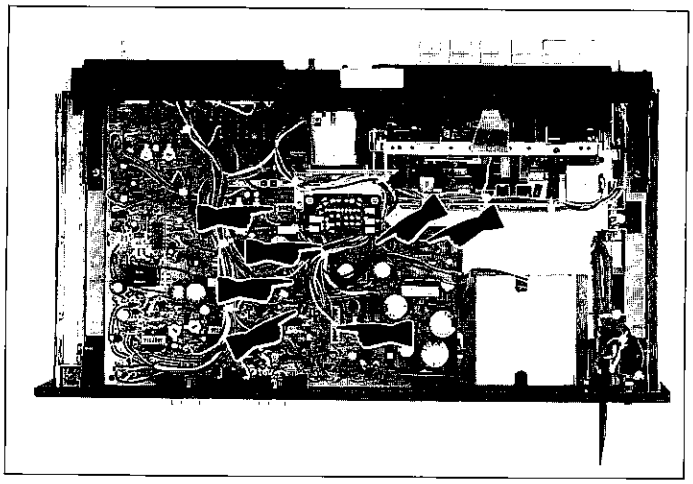


Figure 6–2

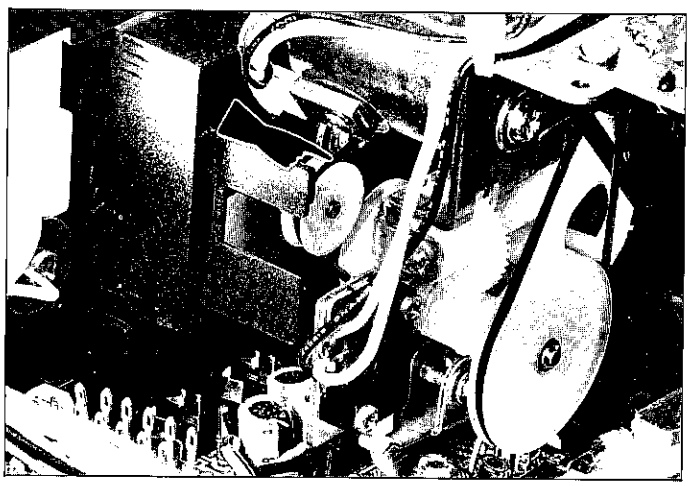


Figure 6–3

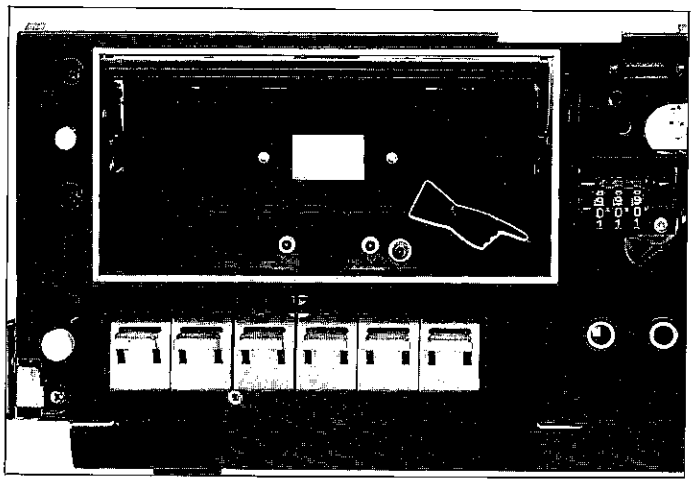


Figure 6–4

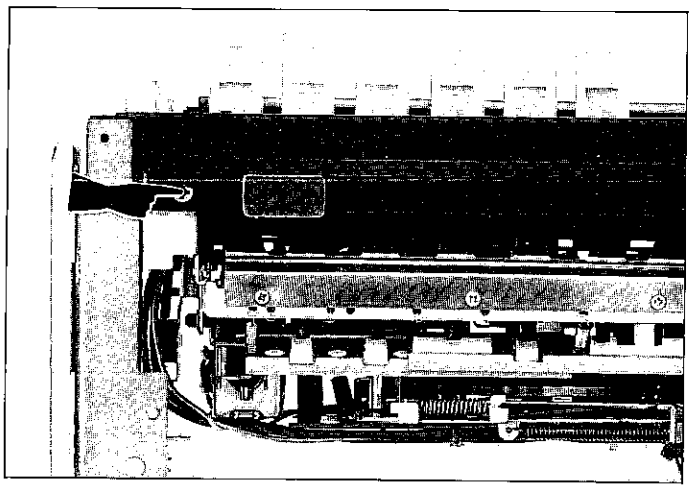


Figure 6–5

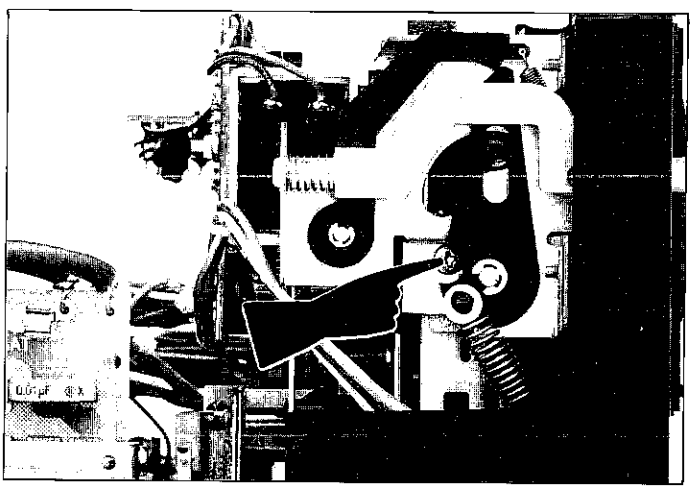


Figure 6–6

MECHANICAL ADJUSTMENT

PAUSE MECHANISM ADJUSTMENT (Refer to Figure 7–1)

1. Set the unit in play mode (push the key marked ▶) and slowly push the pause key. Make sure that the take-up idler and pressure roller come respectively off the take-up turntable and capstan at the same time.
2. If the operation 1 above is found not normal, adjust it by bending a part (marked A) of the pressure roller lever.

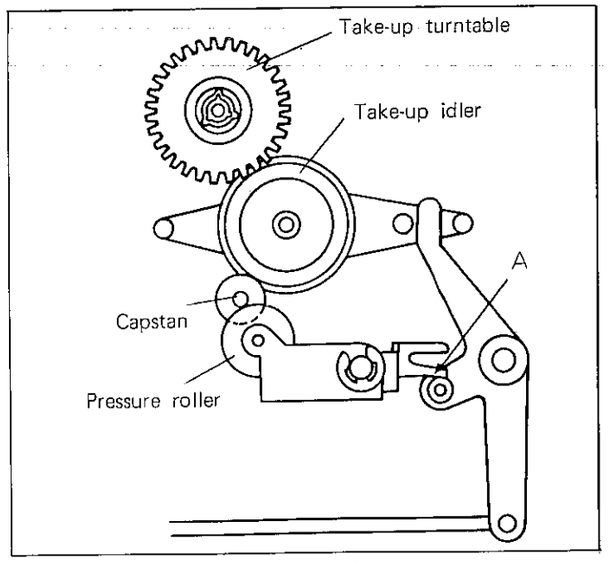


Figure 7–1

PRESSURE ROLLER PRESSURE ADJUSTMENT
(Refer to Figure 7–2)

1. Set the unit in play mode.
2. Use a tension gauge (0 to 500 grams) to push it to a part indicated in Figure 7–2 of the pressure roller until the pressure roller comes off the capstan. After that, gradually weaken the applied force in the reverse direction until the pressure roller hits the capstan (say, it begins to rotate) and make sure that the tension gauge is then reading 250 to 350 grams (8-13/16 oz to 12-11/32 oz).
3. If the above value is not satisfied, adjust the pressure roller pressure spring by bending it or replace.

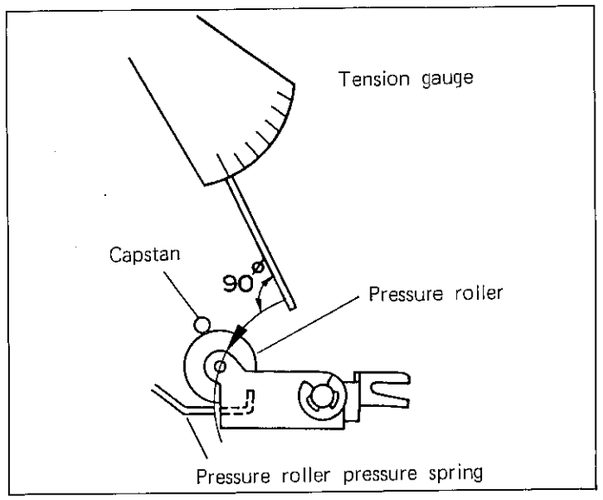


Figure 7–2

CAPSTAN'S THRUST CLEARANCE ADJUSTMENT
(Refer to Figure 7–3)

1. Slowly rotate clockwise the screw adjusting the capstan's thrust clearance until there is no clearance found.
2. Next rotate counterclockwise the said screw by 1/5 to 2/5 turns from the above point. Since screw's pitch is 0.5 mm (.0197 in.), a clearance of 0.1 to 0.2 mm (.0039 in. to .0079 in.) is thus produced.

TAKE-UP PULLEY POSITION ADJUSTMENT
(Refer to Figure 7–3)

1. Set the unit in play mode.
2. Make sure that the take-up idler becomes in contact with the take-up pulley as indicated in Figure 7–3.
3. If the operation 2 above is not satisfied, adjust the position of take-up pulley. (Note that the take-up pulley, made of rubber, is movable over the capstan.)

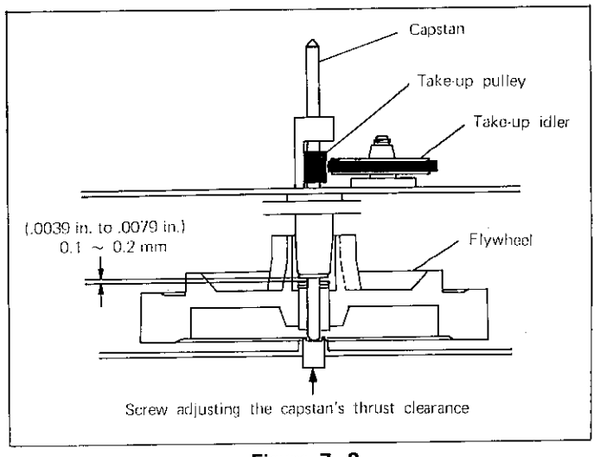


Figure 7–3

TORQUE CHECK IN PLAY/FAST FORWARD/REWIND MODES (Refer to Figure 8–1)

1. Mount a torque measuring reel on the turntable (on the take-up side at Play or Fast Forward mode and to the supply side at Rewind mode).
2. Gradually weaken an applied force by the tension gauge until the turntable begins to rotate at a nearly steady speed, and measure the reading of tension gauge.
3. Normal torque values in each mode are tabulated below.
   Note:
   In play mode, check that when the turntable (take-up side) is stopped, there is no slipping between the turntable and take-up idler or between the take-up idler and take-up pulley.

Mode	Torque value
Play	35 to 60 gram·cm (1–15/64 oz to 2–1/8 oz)
Fast Forward	Over 70 gram·cm (2–15/32 oz)
Rewind	Over 70 gram·cm (2–15/32 oz)

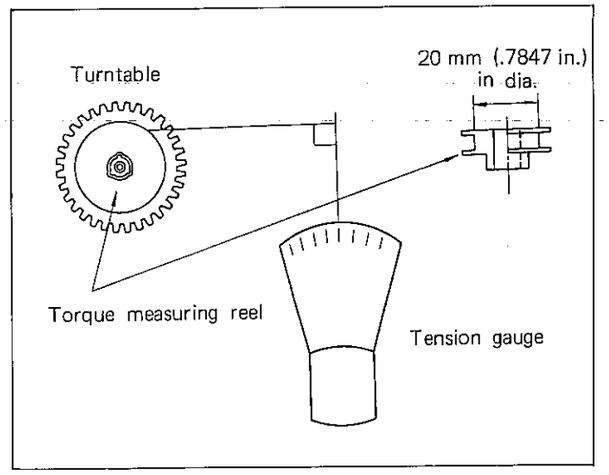


Figure 8–1

PLUNGER/SOLENOID POSITION ADJUSTMENT
(Refer to Figure 8–2)

1. Set the unit in Play or Record mode to stop the turntable (take-up side), then the automatic stop circuit functions to attract the plunger/solenoid. At the time, if the setting position of the plunger/solenoid is not normal, the plunger/solenoid interlocking lever can't fully move the play lever lock plate so that the mechanism can't get in a stop. In this case, loosen the screw retaining the plunger/solenoid to adjust the setting position of the plunger/solenoid (to make the plunger/solenoid proper be in parallel with the mechanism main chassis.)
2. With the unit placed in Play (or Record) mode, make sure that the plunger/solenoid interlocking lever is in contact with the play lever lock plate and simultaneously that there is a clearance of 0 to 0.5 mm (0 to .0197 in.) between the selector lever of the plunger/solenoid interlocking lever and the plate spring of the rewind/fast forward operation lever.
3. Set the unit in Fast Forward (or Rewind) mode and make sure that the plunger/solenoid interlocking lever is in contact with the fast forward/rewind lever lock plate. Next check that the fast forward (or rewind) lever is released enough to fully attract the plunger/solenoid iron core.

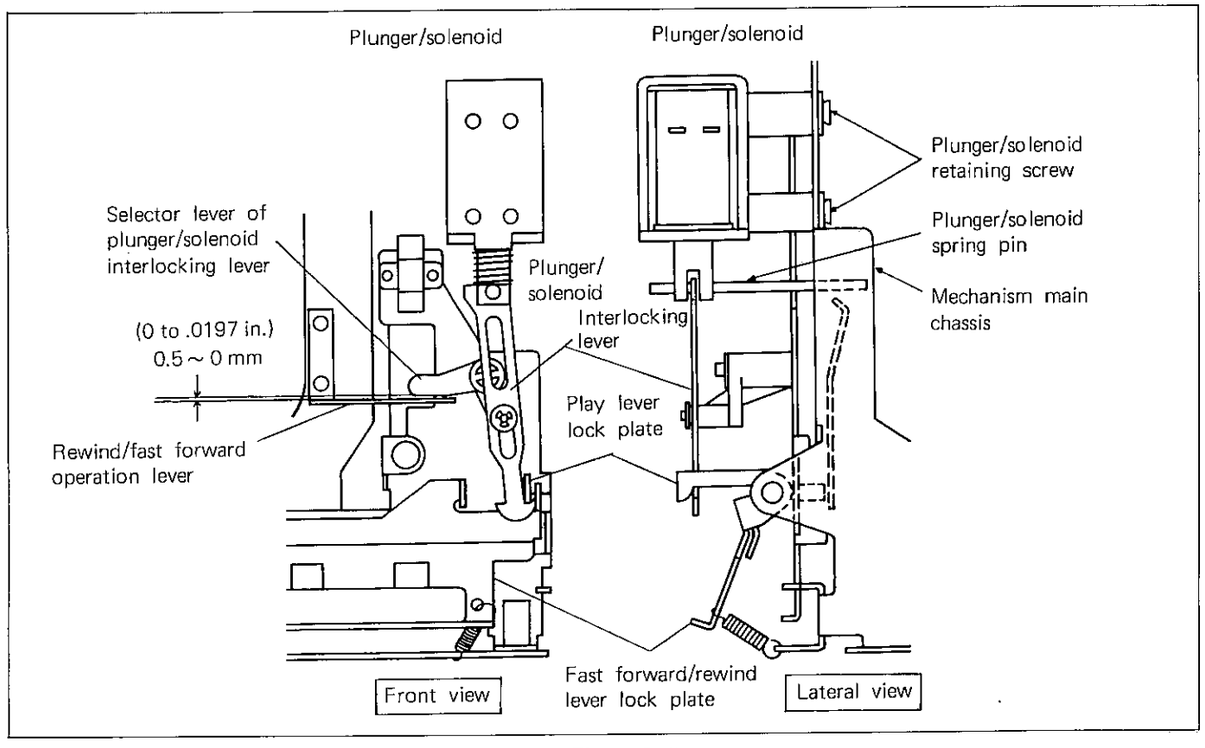


Figure 8–2

ELECTRICAL ADJUSTMENT

ADJUSTMENT POINTS

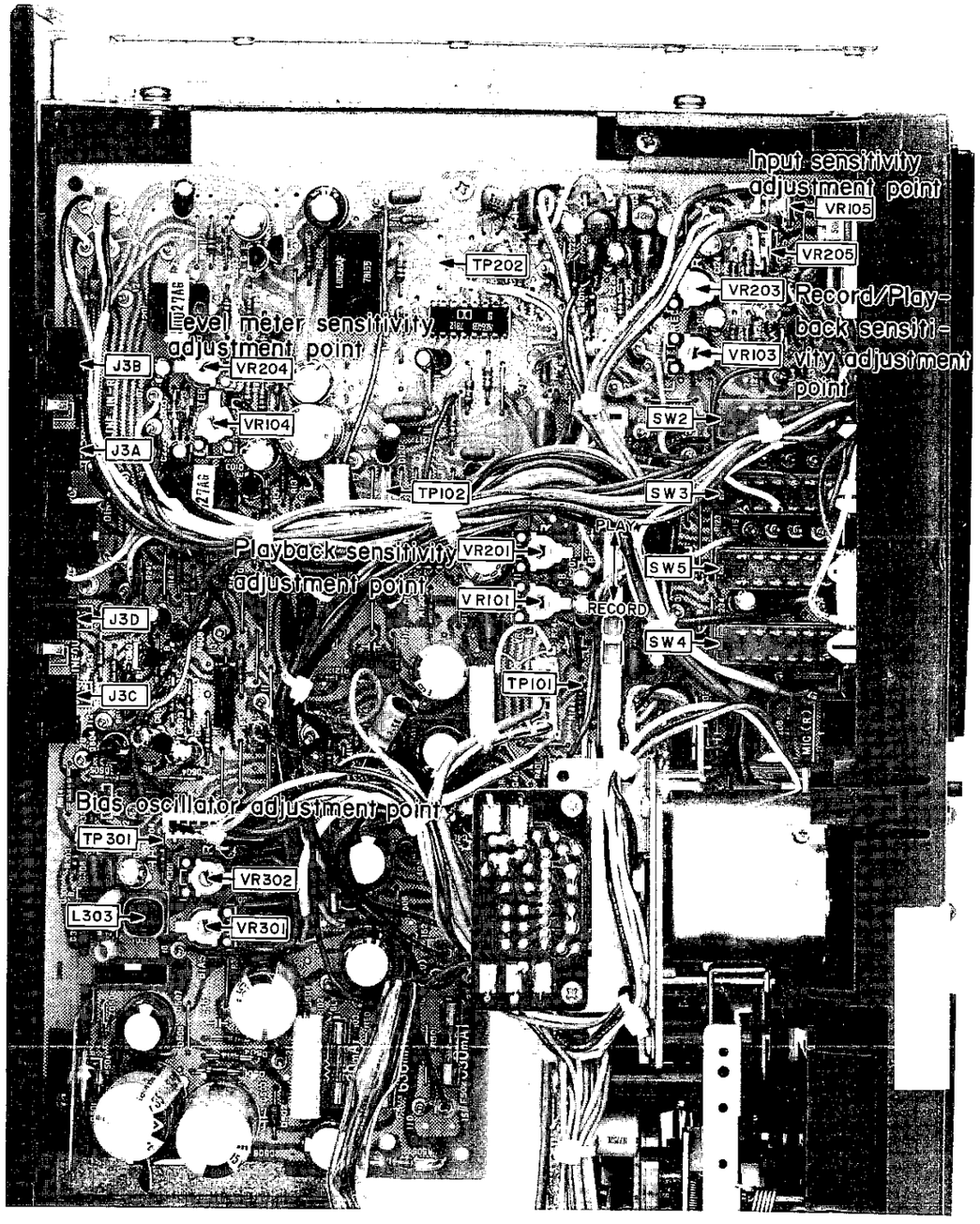


Figure 9

RECORD AMPLIFIER BIAS OSCILLATOR ADJUSTMENT (Refer to Figure 10–1)

1. Connect the V.T.V.M. to the test point (TP101, TP201) and earth.
2. Set the equalizer selector switch (SW2) in the "NORM" position and bias selector switch (SW3) in the "NORM" position.
3. Set the unit record mode.
4. Adjust the oscillation coil (L303) so that the bias oscillation frequency becomes 85 kHz.
5. Adjust the semi-variable resistor (VR301, VR302) so that the V.T.V.M. reads 35 mV.
6. To check the CrO_2 tape mode, leave equalizer selector switch (SW2) in the "CrO_2" position and bias selector switch (SW3) in the "CrO_2" position.
   It is normal if V.T.V.M.'s reading is 43 mV to 49 mV.

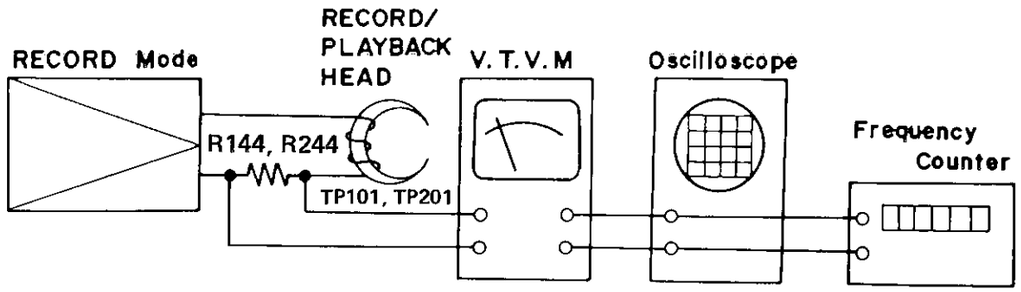


Figure 10–1

ERASE CURRENT CHECK (Refer to Figure 10–2)

1. Connect the V.T.V.M. to the test point (TP301) and earth.
2. Set the equalizer selector switch (SW2) in the "NORM" position and bias selector switch (SW3) in the "NORM" position.
3. Set the unit at record mode.
4. It is normal if V.T.V.M.'s reading is 65 mV to 115 mV.
5. To check the CrO_2 tape mode, leave equalizer selector switch (SW2) in the "CrO_2" position and bias selector switch (SW3) in the "CrO_2" position.
   It is normal if V.T.V.M.'s reading is 90 mV to 150 mV.

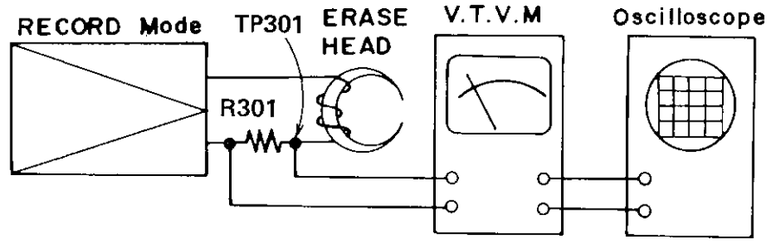


Figure 10–2

RECORD AMPLIFIER INPUT SENSITIVITY ADJUSTMENT (Refer to Figure 11–1)

1. Adjust the level meter sensitivity.
2. Set the Dolby NR switch (SW5) in the "OFF" position, and input selector switch (SW4) in the "LINE" position.
3. Set the equalizer selector switch (SW2) in the "NORM" position and bias selector switch (SW3) in the "NORM" position.
4. With the unit set at record mode, give it signal of –24 dB (63 mV), 1 kHz from line input jacks (J3A, J3B) and adjust the record level controls (VR102, VR202) to "10" position.
5. Turn the semi-variable resistor (VR105, VR205) fully clockwise and make sure that the level meter reads "0 VU ± 3 dB".
   There can be difference for one channel to another for the level meter indication.
   Therefore, make the larger value of one channel be similar to the smaller value of another by adjust semi-variable resistor (VR105, VR205) for the former channel.
6. To check the record amplifier mic. input sensitivity, input selector switch (SW4) in the "MIC/DIN" position.
7. Adjust the record level controls (VR102, VR202) to "10" position.
8. Give the unit 1 kHz signal from microphone jacks (J1, J2) and if the level meter indicates "0 VU" with signal of –74 ± 3 dB (0.14 mV to 0.28 mV), it is normal.

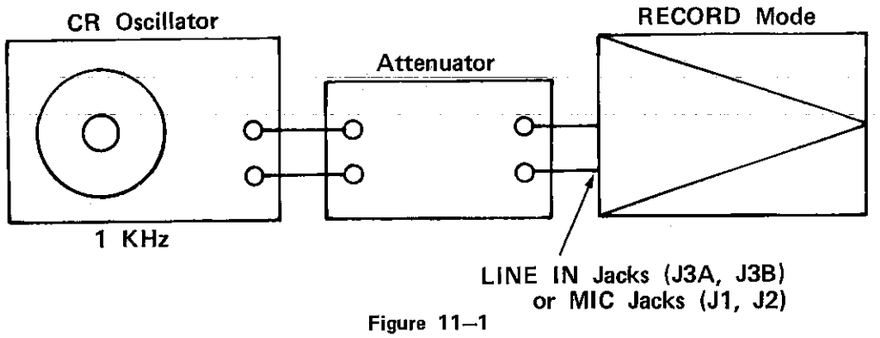


Figure 11–1

RECORD/PLAYBACK HEAD AZIMUTH ADJUSTMENT (Refer to Figure 11–2)

1. Connect the V.T.V.M. to the test point (TP102, TP202) and earth.
2. Set the equalizer selector switch (SW2) in the "NORM" position and Dolby NR switch (SW5) in the "OFF" position.
3. Insert the test tape (TEAC MTT-114, 10kHz, 250pWb/mm, −10 dB recorded) and play it.
4. Adjust the adjusting screw so that the playback output voltage of the test tape becomes maximum in both sides and the phase between channels gets same.

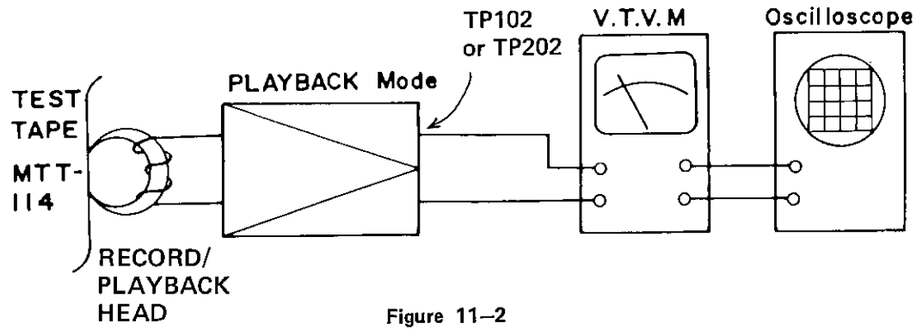


Figure 11–2

PLAYBACK SENSITIVITY ADJUSTMENT (Refer to Figure 11–3)

1. Connect the V.T.V.M. to the test point (TP102, TP202) and earth.
2. Set the equalizer selector switch (SW2) in the "NORM" position and Dolby NR switch (SW5) in the "OFF" position.
3. Insert the test tape (TEAC MTT-150, 400 Hz, 200pWb/mm recorded) and play it.
4. At this time, adjust the semi-variable resistor (VR101 VR201) so that the V.T.V.M. reads 580 mV.

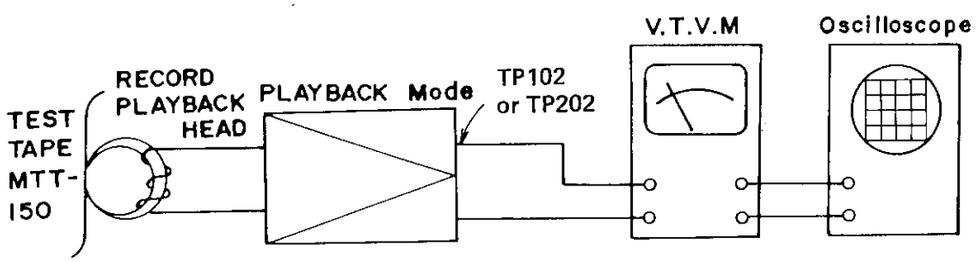


Figure 11–3

LEVEL METER SENSITIVITY ADJUSTMENT (Refer to Figure 12–1)

1. Connect the V.T.V.M. to the test point (TP102, TP202) and earth.
2. Set the Dolby NR switch (SW5) in the "OFF" position, and input selector switch (SW4) in the "LINE" position.
3. With the unit at record mode, give it signal of 1 kHz, 320 mV from line input jacks (J3A, J3B) and adjust the record level controls (VR102, VR202) so that the V.T.V.M. reads 580 mV.
4. At this time, adjust the semi-variable resistor (VR104, VR204) so that the level meter indicates Dolby level (it means a level of "+3 VU" indicated on the level meter).

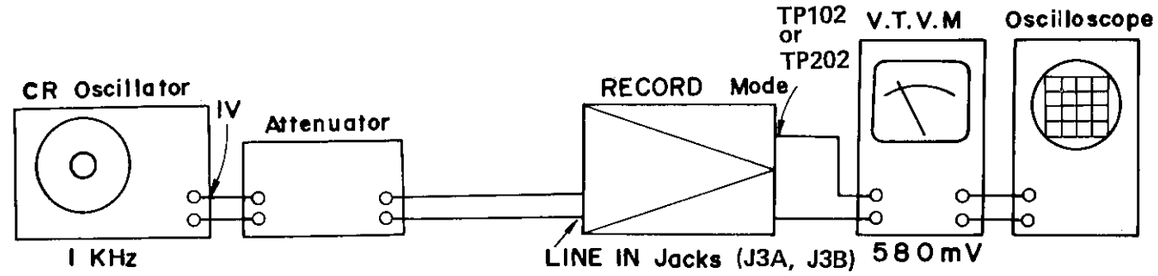


Figure 12–1

RECORD/PLAYBACK SENSITIVITY ADJUSTMENT (Refer to Figure 12–2)

1. Connect the V.T.V.M. to the test point (TP102, TP202) and earth.
2. Set Dolby NR switch (SW5) in the "OFF" position, and input selector switch (SW4) in the "LINE" position.
3. Set the equalizer selector switch (SW2) in the "NORM" position and bias selector switch (SW3) in the "NORM" position.
4. Insert the normal tape (TEAC MTT-502).
5. With the unit set at record mode, give it signal of 1 kHz, 320 mV from line input jacks (J3A, J3B) and adjust the record level controls (VR102, VR202) so that the V.T.V.M. reads 410 mV.
6. And playing it.
7. Adjust the semi-variable resistor (VR103, VR203) so that the V.T.V.M. reads 410 mV.
8. To check the CrO_2 tape (MAXELL C-60UDXL II), leave equalizer selector switch (SW2) in the "CrO_2" position and bias selector switch (SW3) in the "CrO_2" position.
9. It is normal if V.T.V.M.'s reading is 340 mV to 490 mV.

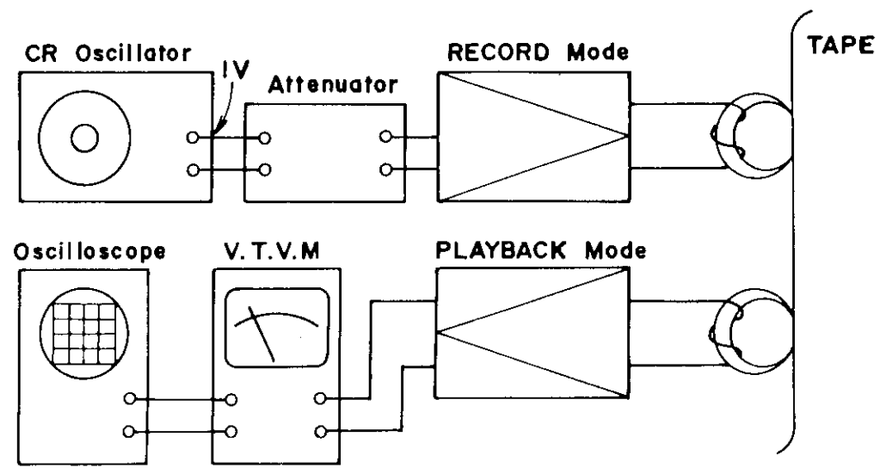


Figure 12–2

DOLBY NOISE REDUCTION CIRCUIT CHECK

(Refer to Figure 13–1)

1. Connect the V.T.V.M. to the test point (TP102, TP202) and earth.
2. Set Dolby NR switch (SW5) in the "ON" position, and input selector switch (SW4) in the "LINE" position.
3. Insert the tape.
4. With the set at record mode, give it signal of –35 dB, (17.8 mV) 100 Hz from line input jacks (J3A, J3B) and adjust the record level controls (VR102, VR202) so that the V.T.V.M. reads 32.6 mV.
5. Give the unit 1 kHz signal, 10 kHz signal and 12.5 kHz signal in the order and if the V.T.V.M. reads as tabulated below with each input signal, it is normal.

Frequency	1 kHz	10 kHz	12.5 kHz
V.T.V.M. reads	45.7 – 81 mV	44.5 – 70 mV	42.6 – 68.2 mV

6. Give the unit signal of –50 dB (3.16 mV), 100 Hz and adjust the record level controls (VR102, VR202) so that the V.T.V.M. reads 5.8 mV.
7. In the same manner as in the step 5 above, give the unit 1 kHz signal, 10 kHz signal and 12.5 kHz signal in the order and if the V.T.V.M. reads as tabulated below with each input signal, it is normal.

Frequency	1 kHz	10 kHz	12.5 kHz
V.T.V.M. reads	8.2 – 16.4 mV	13.7 – 24.9 mV	13.5 – 23.4 mV

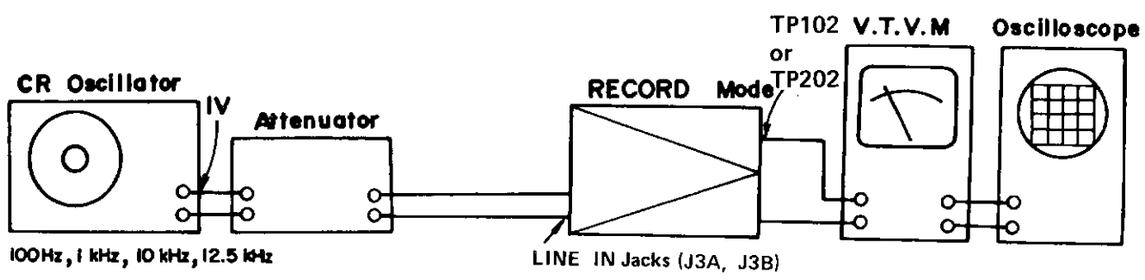


Figure 13–1

CIRCUIT DESCRIPTION

DOLBY NOISE REDUCTION SYSTEM

The construction of Dolby NR circuit is as shown below.

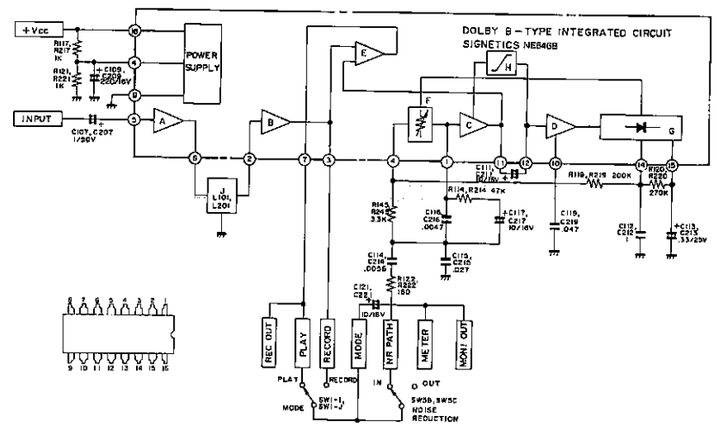


Figure 14–1

The amplifier circuits (A) and (B) are ordinary type. But the Dolby Summing (E) is an amplifier circuit that inverses only the polarity, having the gain of 1. Dolby Side Chain (F, C, D, G) is high-speed limiter that operate on high- or medium frequency. The Fig. 14–2 shows the input/output characteristic curve of the Dolby Side Chain circuit and the curve varies according to the change of frequency.

The frequency characteristic is as shown in Fig. 14–3 and it is the same as that of the high-pass filter of 6 dB/octave. The turnover frequency of the curve also varies according to the change of input level.

If the output signal from Dolby Side Chain circuit shown in Fig. 14–2 or 14–3 and ordinary signal from the amplifier circuit (B) are supplied to the Dolby Summing (E) circuit, these two signals are added to the each other in the record mode showing a compressor characteristic while they are subtracted from the each other in play mode showing an expander characteristic – the input/output characteristic shown in Fig. 15–1 is obtained at Rec. Amp. terminal.

Dolby Side Chain Circuit

The characteristic of the high-pass filter of 6 dB/octave shown in Fig. 14–3 is obtained by that the composite impedances with C114 (C214), C115 (C215), C116 (C216), R122 (R222), R145 (R245) and R114 (R214), and the filter impedance are added to the each other to form an attenuator. The input/output characteristic in Fig. 14–2 is obtained by that DC voltage in proportion to the input is fed back to the attenuator (F). The circuit (C) increases the output of the attenuator to the specified voltage to supply the output to the Dolby Summing Circuit. The circuit (D, G) generates DC voltage and it also controls attack time and recovery time of the limiter.

Simultaneously, AC signal is applied to DC voltage to become NF signal being fed to the circuit (F), in order to reduce the distortion. The Fig. 15–2 represents all the blocks composing of the Dolby Side Chain circuit and shows how they are operating.

Described as above, the Dolby NR circuit compounds linear signal and non-linear signal to produce compressor characteristic in record mode and expander characteristic in playback mode – if these two characteristics are mixed, an original linear characteristic is restored. Thus, noise is reduced because high-frequency signal is attenuated when it passes through the expander circuit.

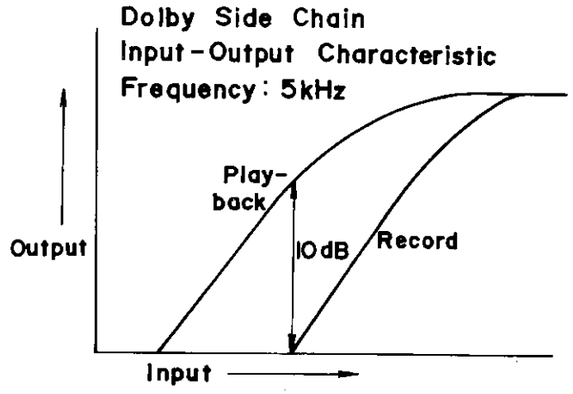


Figure 14–2

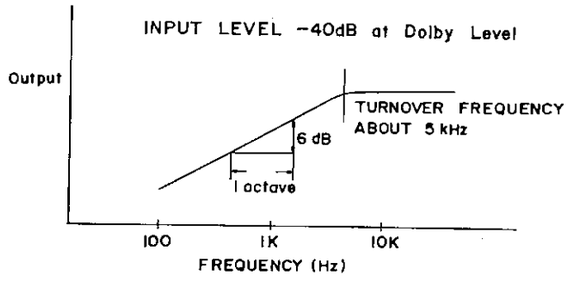


Figure 14–3

Cautions on Repairing

1) The following parts out of those which are used for Dolby NR circuit should be at less than the error of ± 5%.
R145, R245, R114, R214, R119, R219, C114, C214, C115, C215, C116, C216, C119, C219

2) The following parts should be those with the error of within ± 10%.
C113, C213, C112, C212

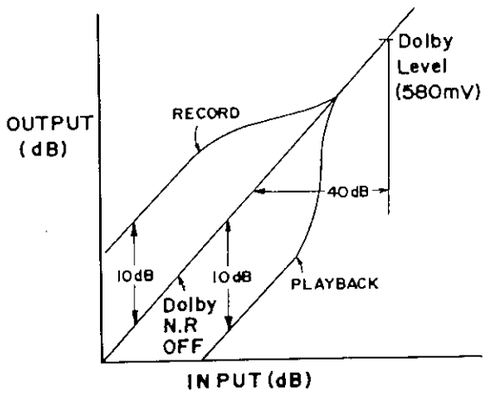


Figure 15–1

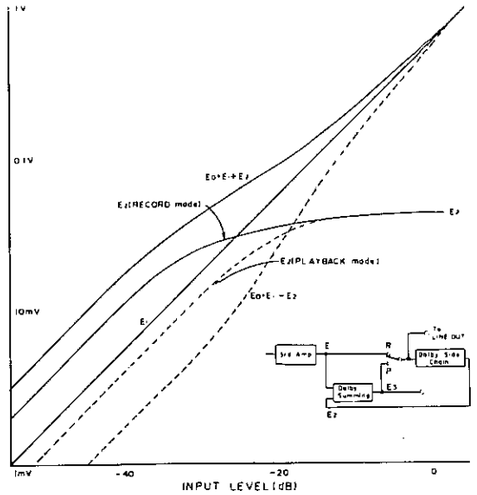


Figure 15–2

APSS (Auto Program Search System)

APSS is an abbreviation of Auto Program Search System uniquely developed by SHARP, which can automatically detect the starting position of each program.
With the APSS system, if the fast forward button or rewind button is depressed during playback mode, the tape is fast forwarded to the starting position of the next program (the end position of the previous program) and then the fast forward button or rewind button is automatically released to make the mechanism be put in playback mode.

OUTLINE OF APSS

LIMITER AMP.
This amplifier is composed of Q401 and Q402 and serves to amplify the output of pre-amplifier to the level where the APSS starts to operation.

VOLTAGE DOUBLING RECTIFIER CIRCUIT
This voltage doubling rectifier circuit is composed of D401 and D402.

TIME CONSTANT CIRCUIT
This time constant circuit is composed of R409 and C404.

LEVEL COMPARISON CIRCUIT
This level comparison circuit is composed of Q403 and Q404. With this level comparison circuit of which the function is based on switching characteristic of transistors, the rectifying voltage, which has been produced by the voltage doubling rectifier circuit and time constant circuit, is used to be input to the base of Q403.

PLUNGER CONTROLLED CIRCUIT
This plunger controlled circuit is composed of Q405 and Q406. The Q405 is a differential circuit to utilize the signal coming from the level comparison circuit to initiate the plunger only at the breaking time.
The Q406 uses the signal coming from the differential circuit to cause switching of the plunger.

FUNCTION OF APSS (Auto Program Search System)

The following are detailed functions of the system. During APSS mode, signals amplified by the integrated circuit (IC1, IC2) enter the limiter amplifier (Q401, Q402) and limited by the transistors (Q401, Q402) and the output of Q402 is rectified by the diodes (D401 and D402). The output of D402 is compared by the level comparison circuit (Q403 and Q404). Next, when the Q403 is turned on, the Q404 is turned off, and the potential of Q404 collector stabilizes at 19.5 V.
Therefore the Q405 is not turned on, in consequence, neither is the Q406. As a result, Q406 is not actuated. In other words, as far as the tape carries signals the plunger does not work, that is, the tape is continuously fast forwarded according to the mechanism of the APSS.
Meanwhile, when there is no signal on the tape, therefore the Q403 is turned off, the Q404 is turned on. Therefore, the collector potential of Q404 becomes 0 V, and consequently, the 19.5 V voltage passes through the R415, allowing a charge current to flow towards the C405.
By this charge current the potential of the Q405 base drops momentarily, and the Q405 is turned on, the current runs in the base of Q406. At this time, current runs in the base of Q406. At this time, current runs in the solenoid to make it be attracted and the mechanism is changed to playback mode from APSS mode.

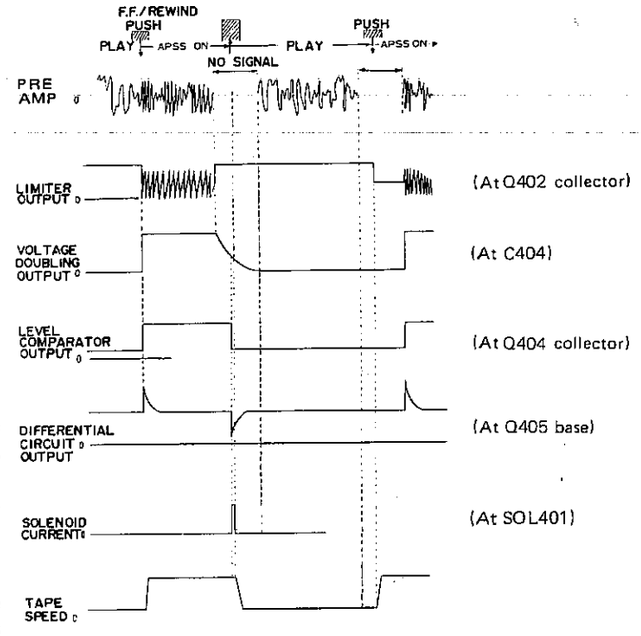


Figure 16–1

FUNCTION OF FULLY AUTOMATIC END-OF-TAPE STOP SYSTEM

The automatic end-of-tape stop system of this set has a design that a mechanical detection of the end of tape results in electrical signal to activate the solenoid (SOL 401).
When the tape reaches its end during playback, record, fast forward or rewind mode, the automatic end-of-tape stop mechanism begins to function setting the automatic end-of-tape stop switch (SW10) at "charge" position. As a result, a charge current runs, via the resistor (R421), in the capacitor (C406) to be charged up. Then the automatic end-of-tape stop mechanism begins to function setting the automatic end-of-tape stop switch (SW10) at "discharge" position. Accordingly, the capacitor (C406) discharges so that the resultant current is applied through the resistor (R419) to the base of the transistor (Q407) where it is amplified. This amplified current is then supplied to the base of the solenoid (SOL 401) driving transistor (Q406), resulting in that the solenoid (SOL 401) is attracted to make the mechanism be set at the stop mode.
Speaking of APSS (Auto Program Search System) mode, the APSS key is unlocked due to the first attraction of solenoid and the play key is unlocked due to the second attraction, which put the mechanism in the stop mode.

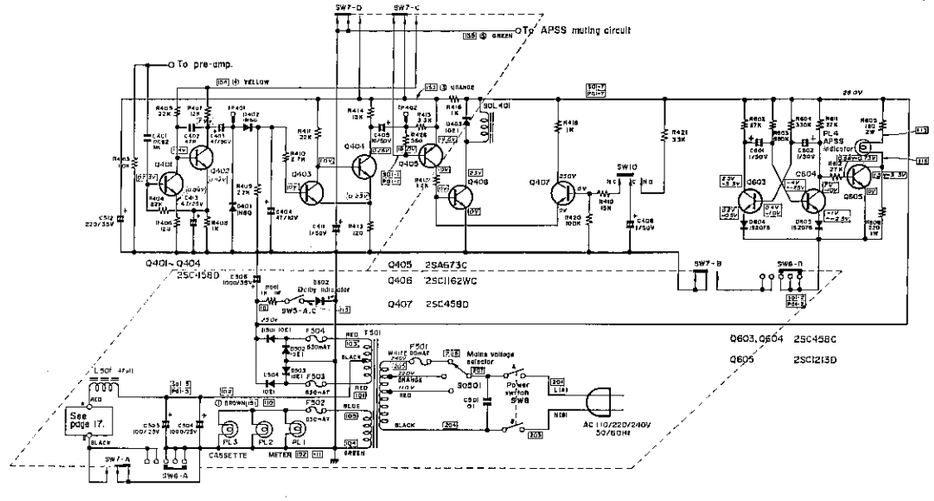


Figure 16–2

QUARTZ-LOCKED PLL SERVO MOTOR

The servo motor employed in this set includes Quartz-Locked PLL (Phase Locked Loop) circuit, so that running of the tape is kept most steady always during operation. With this arrangement, the quartz is oscillated to generate a reference signal to be subject to voltage division and there takes place a phase comparison between this signal and a signal caused by the frequency generator (inside the servo motor): the result is that the motor rotation is locked to the said reference frequency. This is why the system is called a PLL system, which mostly minimizes a possibility of the motor rotating disorderly due to input-load changes, temperature drift and voltage variations, thus assuring a stable tape running at any time.

BEHAVIOR OF MOTOR CONTROL CIRCUIT

The quartz body (HC-18U) is oscillated to create a signal of 10.24 MHz and this signal is then made a reference signal (2.5 kHz) by the frequency divider (IC2), which will be applied to the pin ⑥ of the PLL circuit (IC1). Meanwhile, a signal coming from the frequency generator (inside the motor) is impressed on the pins ⑦ and ⑧ of the PLL circuit (IC1) where it is compared with the said reference signal by the included phase comparator circuit; say, a phase difference between them is here detected to be converted into a voltage. The new voltage, appearing at the pin ① of the IC1, is passed on to the low-pass filter composed of resistors (R1, R2, R3) and capacitors (C1, C2, C3) where it is subjected to the integration to become smoothed, reaching the motor control transistor (Q1) to keep a regular rotation of the motor.

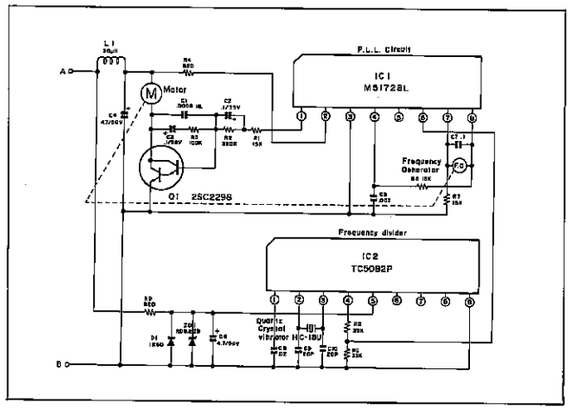


Figure 17–1

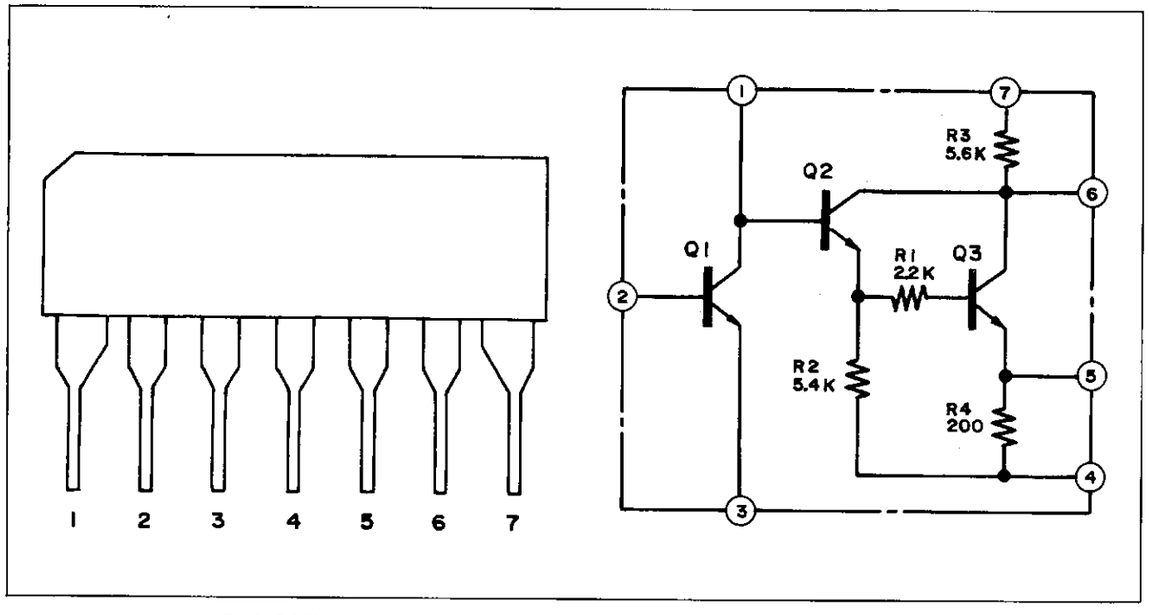


Figure 17–2 EQUIVALENT CIRCUIT OF INTEGRATED CIRCUIT (IC1, IC2)

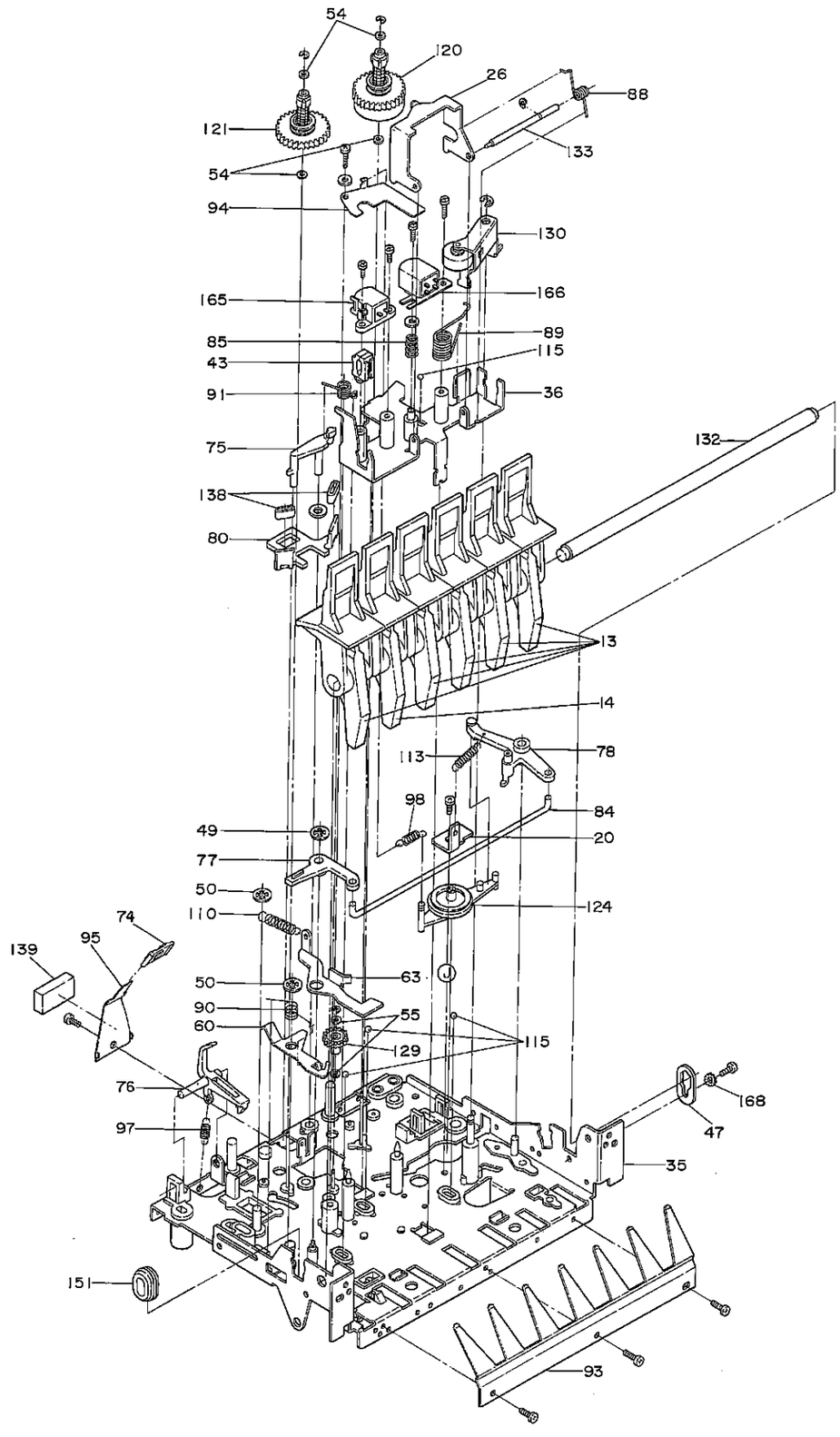


Figure 18 MECHANISM EXPLODED TOP VIEW

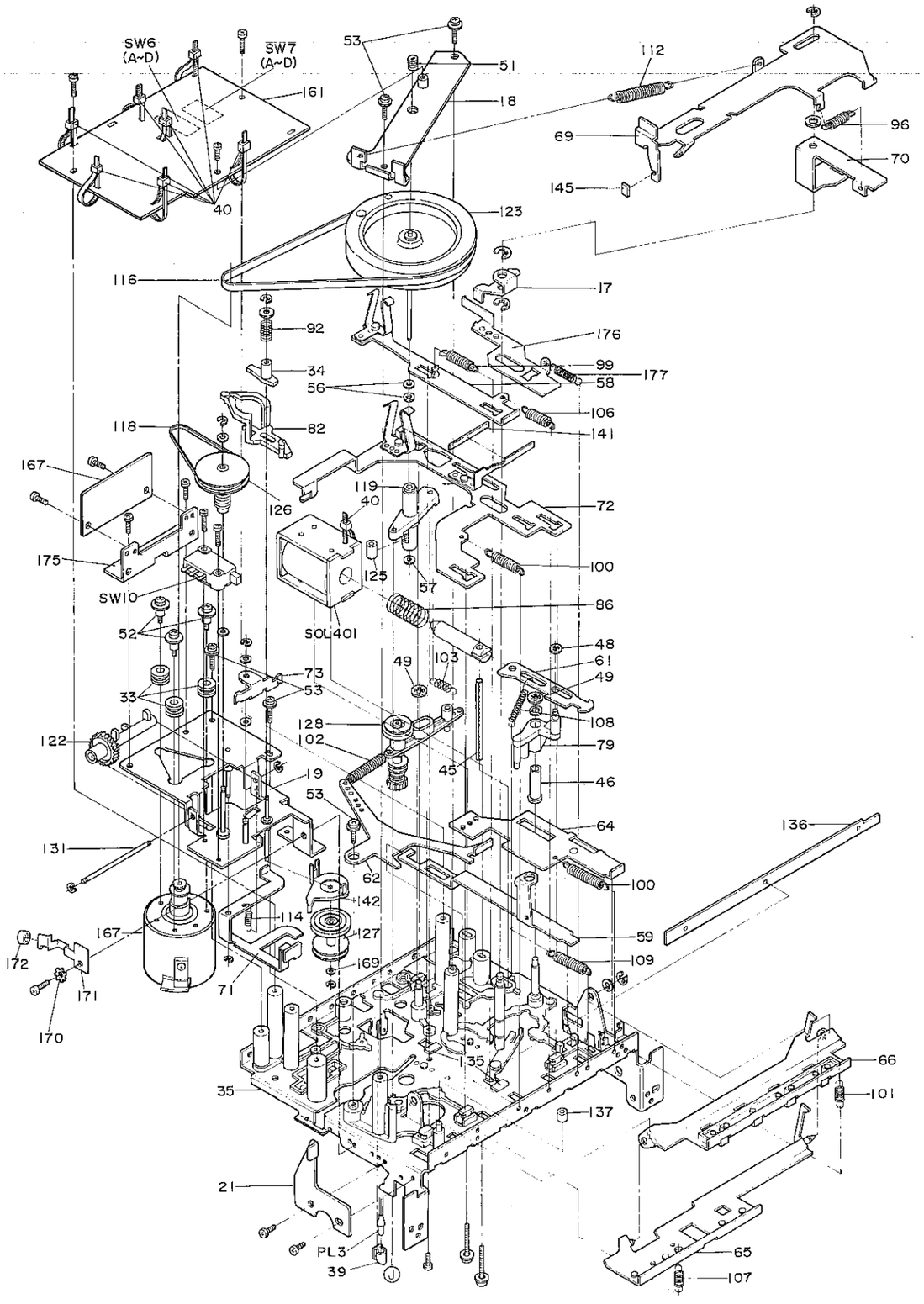


Figure 19 MECHANISM EXPLODED BOTTOM VIEW

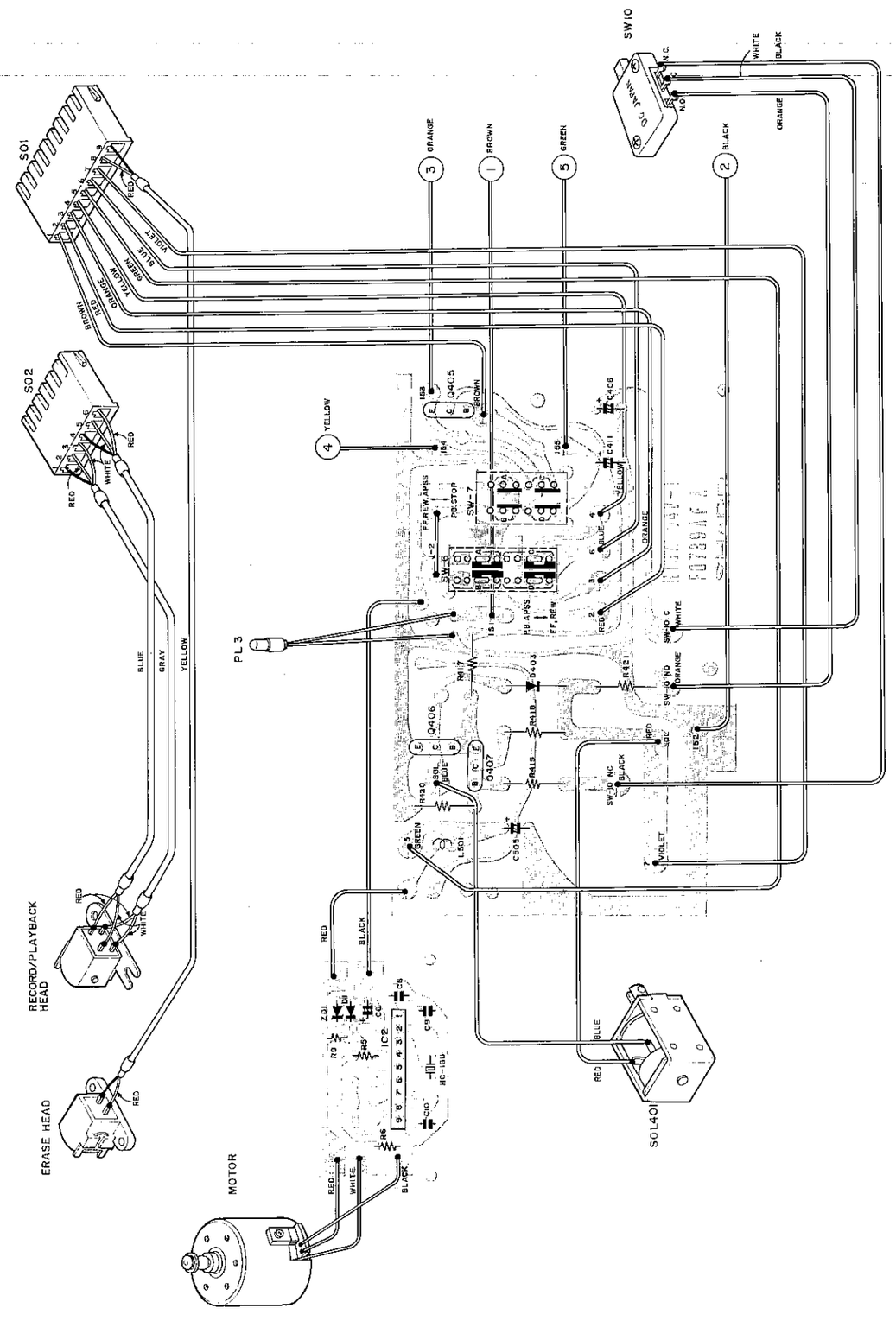
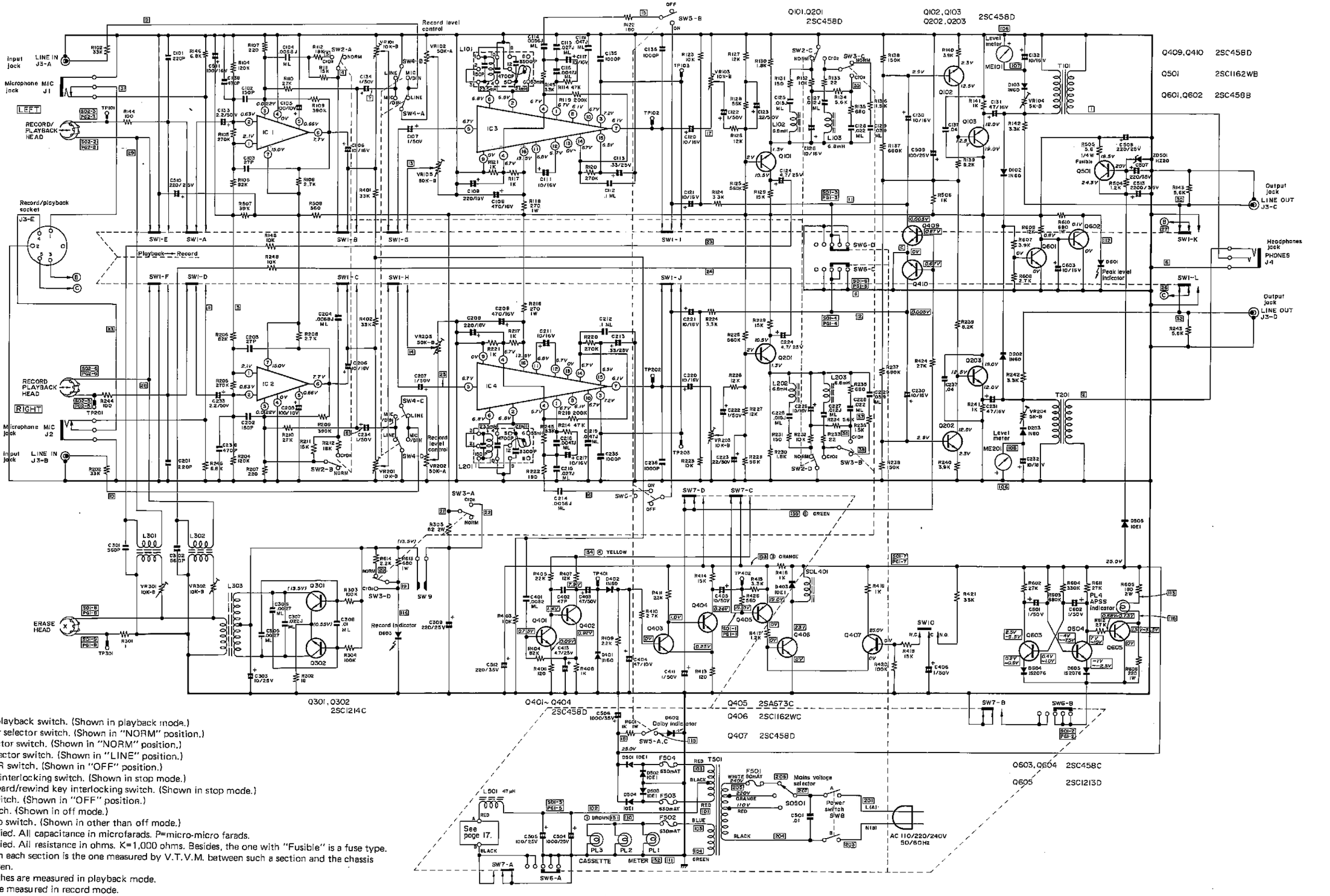


Figure 20 WIRING SIDE OF PRINTED WIRING BOARD (1/2)



NOTES:

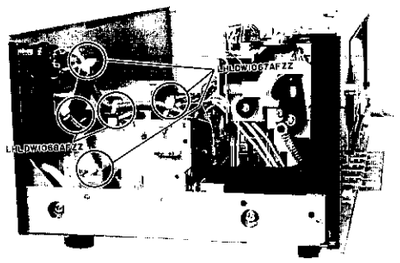
1. SW1 (A–L): Record/playback switch. (Shown in playback mode.)
2. SW2 (A–D): Equalizer selector switch. (Shown in "NORM" position.)
3. SW3 (A–D): Bias selector switch. (Shown in "NORM" position.)
4. SW4 (A–D): Input selector switch. (Shown in "LINE" position.)
5. SW5 (A–D): Dolby NR switch. (Shown in "OFF" position.)
6. SW6 (A–D): Play key interlocking switch. (Shown in stop mode.)
7. SW7 (A–D): Fast forward/rewind key interlocking switch. (Shown in stop mode.)
8. SW8: Power switch. (Shown in "OFF" position.)
9. SW9: Bias switch. (Shown in off mode.)
10. SW10: Auto stop switch. (Shown in other than off mode.)
11. Unless otherwise specified. All capacitance in microfarads. P=micro-micro farads.
12. Unless otherwise specified. All resistance in ohms. K=1,000 ohms. Besides, the one with "Fusible" is a fuse type.
13. The indicated voltage in each section is the one measured by V.T.V.M. between such a section and the chassis with no signal being given.
14. Voltage without parenthes are measured in playback mode.
15. Voltage in parenthes are measured in record mode.
16. Voltage in fences are measured in APSS mode.

(Specifications or wiring diagrams of this model are subject to change for the improvement without prior notice.)

Figure 21 SCHEMATIC DIAGRAM

CAUTION

If any one of the nylon bands shown in the photo is once removed for some reason, be sure to reprise it to the original place in the same appearance as before.



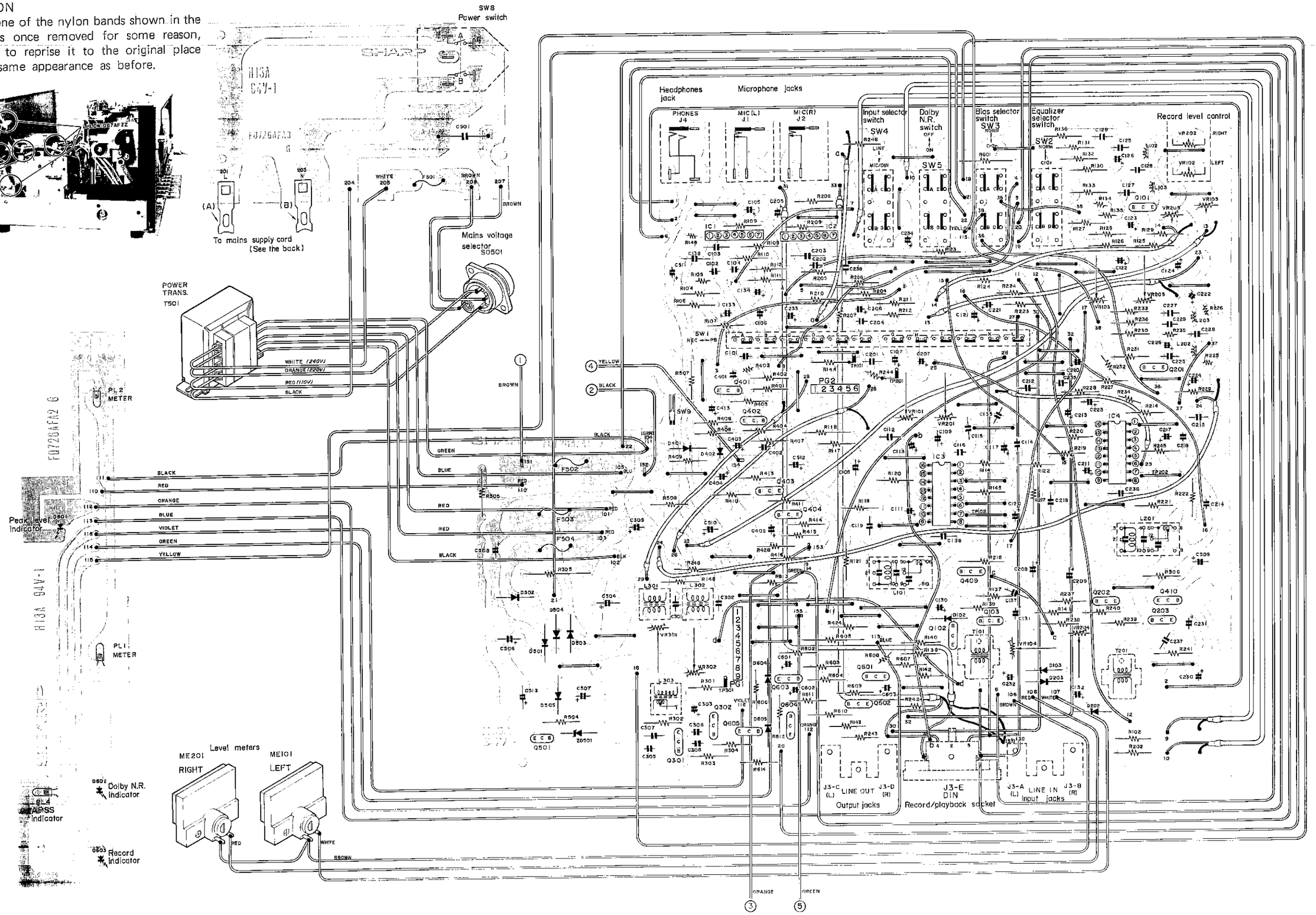


Figure 23 WIRING SIDE OF PRINTED WIRING BOARD (2/2)

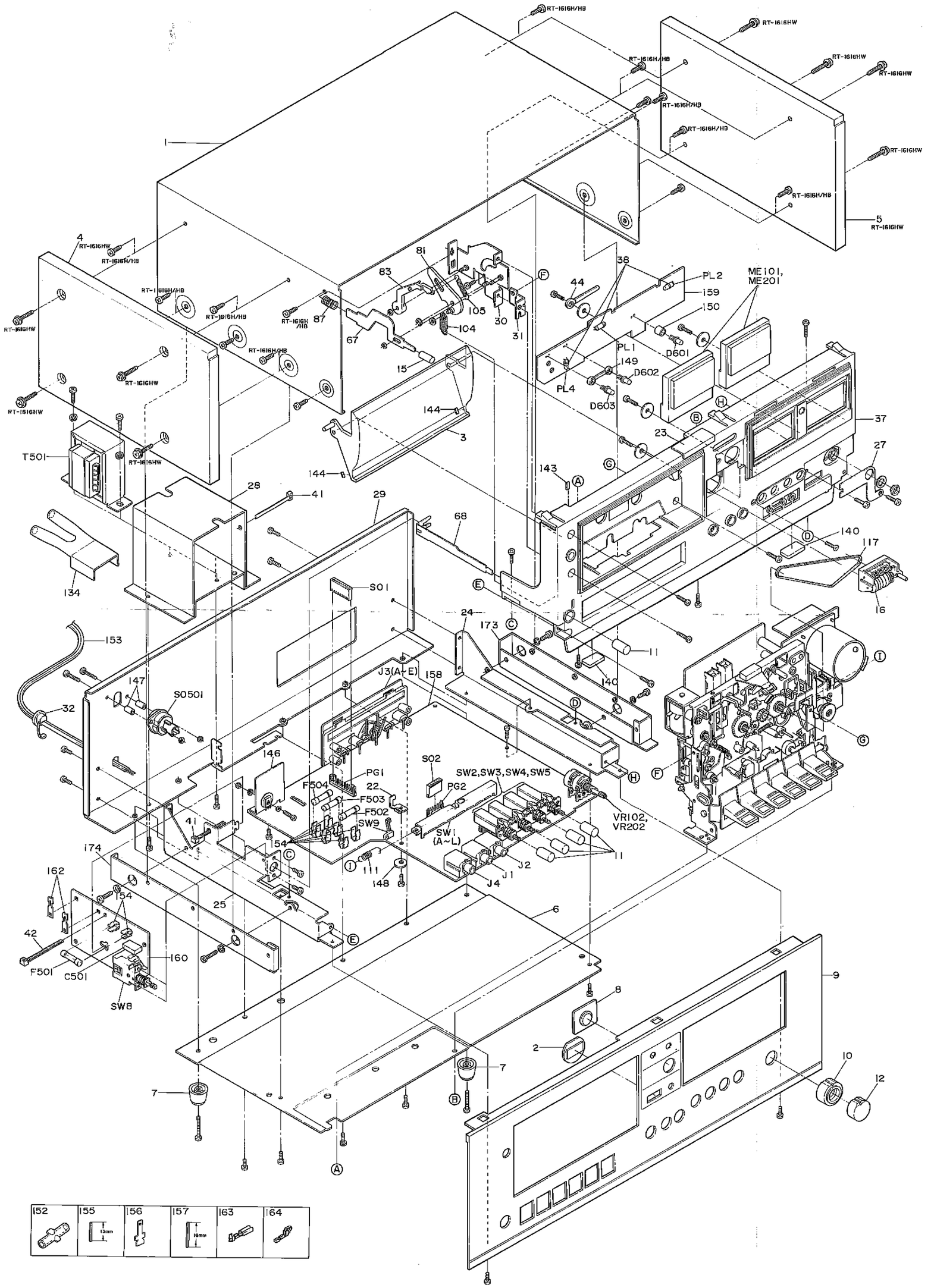
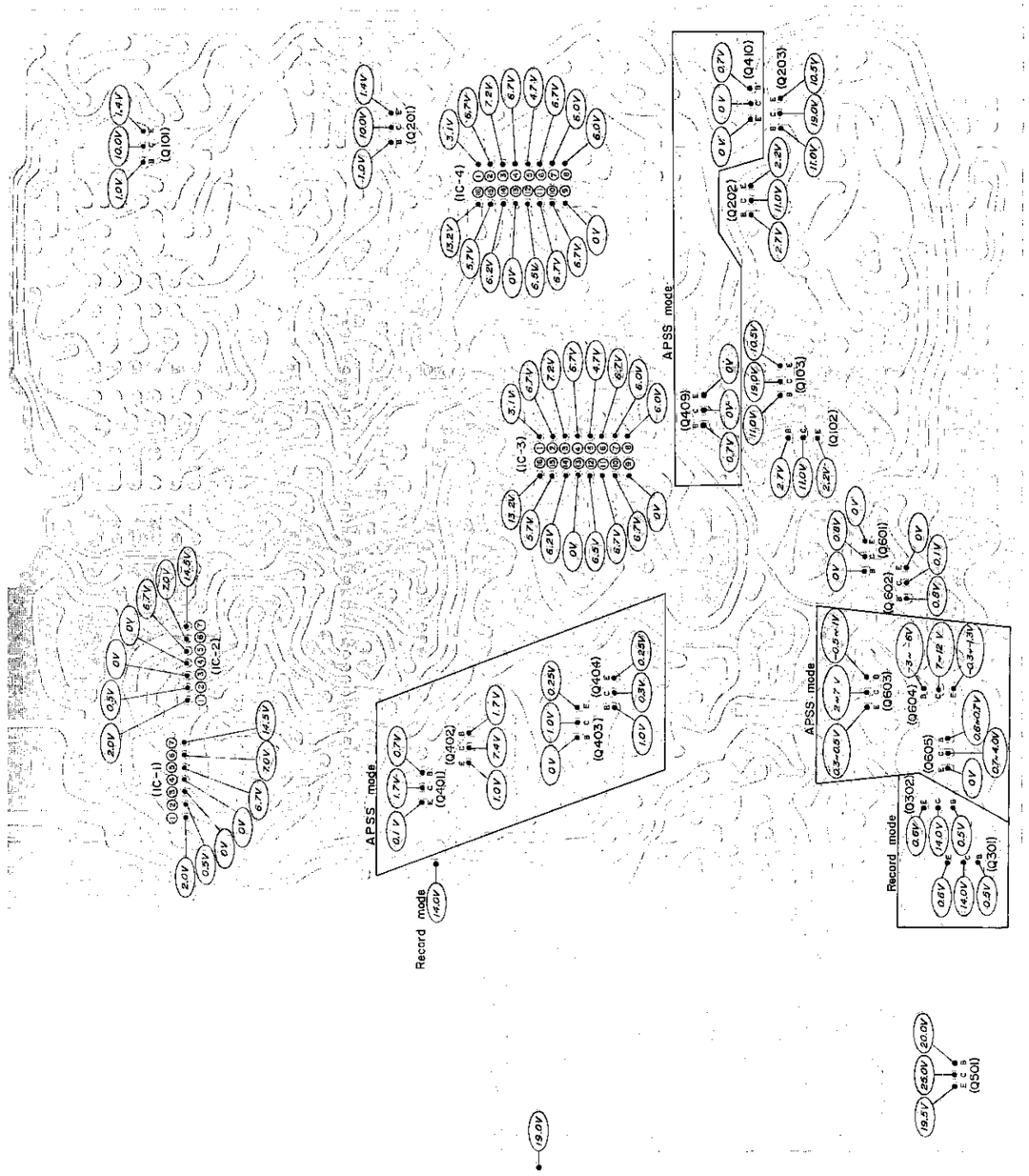


Figure 25 CABINET EXPLODED VIEW



Notes: * ICs and Transistors voltage shows in playback mode.
* Circuit tester range : DC voltage (20K ohm/volt) range.

Figure 27 VOLTAGES ON PRINTED WIRING BOARD

REPLACEMENT PARTS LIST

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

REF. NO.	PART NO.	DESCRIPTION	CODE
		INTEGRATED CIRCUITS	
IC1, IC2	RH-IX0437AGZZ	Audio Amp. (TA7129P)	AH
IC3, IC4	VHINE646B//-1	Dolby Noise Reduction Circuit (NE646B)	AS
		TRANSISTORS	
Q101, Q201	VS2SC458-D/-1	Record Amp. (2SC458D)	AC
Q102, Q202	VS2SC458-D/-1	Meter Amp. (2SC458D)	AC
Q103, Q203	VS2SC458-D/-1	Meter Amp. (2SC458D)	AC
Q301, Q302	VS2SC1214-C-1	Bias Oscillator (2SC1214C)	AD
Q401	VS2SC458-D/-1	APSS Limiter Amp. (2SC458D)	AC
Q402	VS2SC458-D/-1	APSS Limiter Amp. (2SC458D)	AC
Q403	VS2SC458-D/-1	Level Comparison (2SC458D)	AC
Q404	VS2SC458-D/-1	Level Comparison (2SC458D)	AC
Q405	VS2SA673-C/-1	Differential Circuit (2SA673C)	AE
Q406	VS2SC1162WC-1	Solenoid Switching (2SC1162WC)	AF
Q407	VS2SC458-D/-1	Auto Stop Circuit (2SC458D)	AC
Q409, Q410	VS2SC458-D/-1	APSS Muting (2SC458D)	AC
Q501	VS2SC1162WB-3	Ripple Filter (2SC1162WB)	AF
Q601, Q602	VS2SC458-B/-1	Peak Indicator (2SC458B)	AC
Q603, Q604	VS2SC458-C/-1	Multivibrator, APSS Indicator (2SC458C)	AC
Q605	VS2SC1213-D-1	APSS Indicator Switching (2SC1213D)	AD
		DIODES	
D102, D202	VHD1N60////-1	Peak Indicator Circuit (1N60)	AB
D103, D203	VHD1N60////-1	Meter Rectifier (1N60)	AB
D401, D402	VHD1N60////-1	Voltage Doubling Rectifier (1N60)	AB
D403	RH-DX1006AFZZ	Surge Absorber (10E1)	AC
D501, D505, D503, D504	RH-DX1006AFZZ	Rectifier (10E1)	AC
D502	VHD10E1////-1	Rectifier (10E1)	AC
D601	VHPGL-52AR/1F	Peak Level Indicator (GL-52AR)	AD
D602	VHPGL-52AR/1F	Dolby Indicator (GL-52AR)	AD
D603	VHPGL-52AR/1F	Record Indicator (GL-52AR)	AD
D604, D605	VHD1S2076//-1	Transistor Protection (1S2076)	AG
ZD501	VHEHZ20////-1	Zener, 20V, 400mW (HZ20)	AD
		COILS	
L101, L201	RCILL0058AFZZ	Trap, 85kHz/19kHz	AK
L102, L202	RCILZ0019AGZZ	Equalizer, 6.8mH	AD
L103, L203	RCILZ0019AGZZ	Equalizer, 6.8mH	AD
L301, L302	RCILB0376AFZZ	Bias Step-up	AE
L303	RCILB0086AGZZ	Bias Oscillator	AF
L501	RCILF0014AGZZ	Choke, 47μH	AC
		TRANSFORMERS	
T101, T201	RTRNS0027AGZZ	Headphones Output	AE
T501	RTRNP0454AFZZ	Power	BA
		CONTROLS	
VR101, VR201	RVR-M0127AFZZ	10K ohm (B), Playback Sensitivity Adjust	AC
VR102, VR202	RVR-A0117AFZZ	50K ohm (A), Record Level	AP
VR103, VR203	RVR-M0127AFZZ	10K ohm (B), Record Sensitivity Adjust	AC
VR104, VR204	RVR-M0126AFZZ	5K ohm (B), Meter Sensitivity Adjust	AC
VR105, VR205	RVR-M0158AFZZ	50K ohm (B), Record Sensitivity Adjust	AC
VR301, VR302	RVR-M0127AFZZ	10K ohm (B), Bias Current Adjust	AC
		ELECTROLYTIC CAPACITORS	
C105, C205	VCEAAU1AW107Y	100MFD, 10V, +50 –10%	AB
C106, C206	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C107, C207	VCEALU1HC105M	1MFD, 50V, ±20%	AC
C108, C208	VCEAAU1CW477Y	470MFD, 16V, +50 –10%	AD
C109, C209	VCEAAU1CW227Y	220MFD, 16V, +50 –10%	AC
C111, C211	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
C113, C213	VCAAAU1EB334K	.33MFD, 25V, ±10%	AC
C117, C217	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C120, C220	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C121, C221	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C122, C222	VCEAAU1HW105A	1MFD, 50V, +75 –10%	AB
C123, C223	VCEALU1HW224M	.22MFD, 50V, ±20%	AB
C124, C224	VCEAAU1EW475A	4.7MFD, 25V, +75 –10%	AB
C126, C226	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C130, C230	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C131, C231	VCEAAU1CW476Y	47MFD, 16V, +50 –10%	AC
C132, C232	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB
C133, C233	VCEALU1HC225A	2.2MFD, 50V, +75 –10%	AC
C134, C234	VCEAAU1HW105A	1MFD, 50V, +75 –10%	AB
C303	VCEAAU1EW106Y	10MFD, 25V, +50 –10%	AB
C309	VCEAAU1EW227Y	220MFD, 25V, +50 –10%	AC
C403	VCEALU1HW474M	.47MFD, 50V, ±20%	AB
C404	VCEAAU1AW476Y	47MFD, 10V, +50 –10%	AB
C405	VCEAAU1HW106Y	10MFD, 50V, +50 –10%	AC
C406	VCEAAA1HW105A	1MFD, 50V, +75 –10%	AB
C411	VCEAAA1HW105A	1MFD, 50V, +75 –10%	AB
C413	VCEAAU1EW475A	4.7MFD, 25V, +75 –10%	AB
C504	VCEAAU1EW108Y	1000MFD, 25V, +50 –10%	AF
C505	VCEAAU1EW107Y	100MFD, 25V, +50 –10%	AC
C506	VCEAAU1VW108Y	1000MFD, 35V, +50 –10%	AG
C507	VCEAAU1VW227Y	220MFD, 35V, +50 –10%	AD
C508	VCEAAU1EW227Y	220MFD, 25V, +50 –10%	AC
C509	VCEAAU1EW107Y	100MFD, 25V, +50 –10%	AC
C510	VCEAAU1EW227Y	220MFD, 25V, +50 –10%	AC
C511	VCEAAU1CW107Y	100MFD, 16V, +50 –10%	AC
C512	VCEAAU1VW227Y	220MFD, 35V, +50 –10%	AD
C513	VCEAAU1VW228Y	2200MFD, 35V, +50 –10%	AK
C601, C602	VCEALU1HW105M	1MFD, 50V, ±20%	AD
C603	VCEAAU1CW106Y	10MFD, 16V, +50 –10%	AB

CAPACITORS

C101, C201	VCCSPU1HL221K	220PF, 50V, ±10%, Ceramic	**
C102, C202	VCCSPU1HL151K	150PF, 50V, ±10%, Ceramic	**
C103, C203	VCCSPU1HL270K	27PF, 50V, ±10%, Ceramic	**
C104, C204	VCQYSH1HM682J	.0068MFD, 50V, ±5%, Mylar	AB
C112, C212	VCQYSH1HM104K	.1MFD, 50V, ±10%, Mylar	AC
C114, C214	VCQYSH1HM562J	.0056MFD, 50V, ±5%, Mylar	AB
C115, C215	VCQYSH1HM273J	.027MFD, 50V, ±5%, Mylar	AB
C116, C216	VCQYSH1HM472J	.0047MFD, 50V, ±5%, Mylar	AB
C119, C219	VCQYSH1HM473J	.047MFD, 50V, ±5%, Mylar	AB
C125, C225	VCQYSH1HM153J	.015MFD, 50V, ±5%, Mylar	**
C127, C227	VCQYSH1HM123J	.012MFD, 50V, ±5%, Mylar	AB
C128, C228	VCQYSH1HM223K	.022MFD, 50V, ±10%, Mylar	AB
C129, C229	VCQYSH1HM393K	.039MFD, 50V, ±10%, Mylar	AB
C135, C235	VCKZPU1HF102Z	1000PF, 50V, +80–20%, Ceramic	**
C136, C236	VCKZPU1HF102Z	1000PF, 50V, +80 –20%, Ceramic	**
C137, C237	VCKZPU1HF403Z	.04MFD, 50V, +80–20%, Ceramic	**
C138, C238	VCCSPU1HL471K	470PF, 50V, ±10%, Ceramic	**
C301, C302	VCCSPU1HL561K	560PF, 50V, ±10%, Ceramic	**
C305, C306	VCQYSH1HM272K	.0027MFD, 50V, ±10%, Mylar	AB
C307	VCQYSH1HM223J	.022MFD, 50V, ±5%, Mylar	AC
C308	VCQYSH1HM103K	.01MFD, 50V, ±10%, Mylar	AB
C401	VCQYSH1HM822K	.0082MFD, 50V, ±10%, Mylar	AB
C402	VCCSPU1HL470K	47PF, 50V, ±10%, Ceramic	**
C501	RC-HZ053CAFZZ	.01MFD, 250V, ±20%, Metalized Paper	AG

RESISTORS

(Unless otherwise specified resistors are 1/4W, ±5%, Carbon type).

R102, R202	VRD-ST2EE333J	33K ohm	**
R104, R204	VRD-ST2EE124J	120K ohm	**
R105	VRD-SU2EY274J	270K ohm	**
R205	VRD-ST2EE274J	270K ohm	**
R106, R206	VRD-ST2EE823J	82K ohm	**
R107	VRD-ST2EE221J	220 ohm	**
R207	VRD-SU2EY221J	220 ohm	**
R108, R208	VRD-ST2EE272J	2.7K ohm	**
R109, R209	VRD-ST2EE394J	390K ohm	**
R110, R210	VRD-ST2EE273J	27K ohm	**
R111, R211	VRD-ST2EE153J	15K ohm	**
R112, R212	VRD-ST2EE183J	18K ohm	**
R114, R214	VRD-ST2EE473J	47K ohm	**
R117, R217	VRD-ST2EE102J	1K ohm	**
R118, R218	VRS-PT3AB271K	270 ohm, 1W, ±10%, Oxide Film	**
R119, R219	VRD-ST2EE204J	200K ohm	**
R120, R220	VRD-ST2EE274J	270K ohm	**
R121, R221	VRD-ST2EE102J	1K ohm	**
R122, R222	VRD-ST2EE181J	180 ohm	**
R123, R223	VRD-ST2EE103J	10K ohm	**
R124, R224	VRD-ST2EE332J	3.3K ohm	**
R125	VRD-ST2EE564J	560K ohm	**
R225	VRD-SU2EY564J	560K ohm	**
R126	VRD-ST2EE123J	12K ohm	**
R226	VRD-SU2EY123J	12K ohm	**
R127, R227	VRD-ST2EE123J	12K ohm	**
R128, R228	VRD-ST2EE563J	56K ohm	**
R129, R229	VRD-ST2EE153J	15K ohm	**
R130, R230	VRD-ST2EE182J	1.8K ohm	**
R131, R231	VRD-ST2EE151J	150 ohm	**
R232	VRD-SU2EY103J	10K ohm	**
R132	VRD-ST2EE103J	10K ohm	**
R133, R233	VRD-ST2EE220J	22 ohm	**
R134, R234	VRD-SU2EY562J	5.6K ohm	**
R135, R235	VRD-SU2EY681J	680 ohm	**
R136, R236	VRD-ST2EE152J	1.5K ohm	**
R137, R237	VRD-ST2EE684J	680K ohm	**
R138, R238	VRD-ST2EE154J	150K ohm	**
R139, R239	VRD-ST2EE822J	8.2K ohm	**
R140, R240	VRD-ST2EE392J	3.9K ohm	**
R141, R241	VRD-ST2EE102J	1K ohm	**
R142, R242	VRD-ST2EE332J	3.3K ohm	**
R143, R243	VRD-ST2EE562J	5.6K ohm	**
R144	VRD-ST2EE101J	100 ohm	**
R244	VRD-SU2EY101J	100 ohm	**
R145, R245	VRD-ST2EE332J	3.3K ohm	**
R146	VRD-SU2EY682J	6.8K ohm	**
R246	VRD-ST2EE682J	6.8K ohm	**
R148, R248	VRD-ST2EE103J	10K ohm	**
R301	VRD-ST2EE1R0J	1 ohm	**
R302	VRD-ST2EY180J	18 ohm	**
R303, R304	VRD-ST2EE104J	100K ohm	**
R305	VRS-PT3DB820K	82 ohm, 2W, ±10%, Oxide Film	**
R401, R402	VRD-ST2EE333J	33K ohm	**
R403	VRD-ST2EE103J	10K ohm	**
R404	VRD-ST2EE823J	82K ohm	**
R405	VRD-ST2EE223J	22K ohm	**
R406	VRD-ST2EE121J	120 ohm	**
R407	VRD-ST2EE123J	12K ohm	**
R408	VRD-ST2EE102J	1K ohm	**
R409	VRD-ST2EE222J	2.2K ohm	**
R410	VRD-ST2EE272J	2.7K ohm	**
R411	VRD-ST2EE223J	22K ohm	**
R413	VRD-ST2EE121J	120 ohm	**
R414	VRD-ST2EE153J	15K ohm	**
R415	VRD-ST2EE332J	3.3K ohm	**
R416	VRD-ST2EE102J	1K ohm	**
R417	VRD-ST2EY122J	1.2K ohm	**
R418	VRD-ST2EY102J	1K ohm	**
R419	VRD-ST2EY153J	15K ohm	**
R420	VRD-ST2EY104J	100K ohm	**
R421	VRD-ST2EY333J	33K ohm	**
R424	VRD-ST2EE273J	27K ohm	**
R426	VRD-ST2EE561J	560 ohm	**
R504	VRD-ST2EE122J	1.2K ohm	**
R505	VRG-ST2EA5R6J	5.6 ohm, 1/4W, ±5%, Fusible	AB
R506	VRD-ST2EE102J	1K ohm	**
R507	VRD-ST2EE393J	39K ohm	**
R508	VRD-ST2EE561J	560 ohm	**
R601	VRS-PT3AB102K	1K ohm, 1W, ±10%, Oxide Film	**
R602	VRD-ST2EE273J	27K ohm	**
R603	VRD-ST2EE684J	680K ohm	**
R604	VRD-ST2EE334J	330K ohm	**
R605	VRS-PT3DB181K	180 ohm, 2W, ±10%, Oxide Film	**
R606	VRS-PT3AB221K	220 ohm, 1W, ±10%, Oxide Film	**
R607	VRD-ST2EE392J	3.9K ohm	**
R608	VRD-SU2EY272J	2.7K ohm	**
R609	VRD-ST2EE123J	12K ohm	**
R610	VRS-PT3AB681K	680 ohm, 1W, ±10%, Oxide Film	**
R611	VRD-ST2EE273J	27K ohm	**
R612	VRD-ST2EE273J	27K ohm	**
R613	VRS-PT3AB681K	680 ohm, 1W, ±10%, Oxide Film	**
R614	VRD-ST2EE222J	2.2K ohm	**

MISCELLANEOUS

1	GCAB-3060AFSA	Cabinet	**
2	GCOVA1069AFSA	Cover, Tape Counter	AC
3	GDORF3053AFSA	Door, Cassette Chamber	AG
4	GITAS0031AFSA	Decoration Plate, Left Hand Side (RT-1616HW)	**
5	GITAS0032AFSA	Decoration Plate, Right Hand Side (RT-1616HW)	**
6	GITAU0006AFZZ	Lid, Bottom	AH
7	GLEGP0053AF00	Leg	AC
8	HDECQ0056AFSA	Cover, APSS Indicator (RT-1616H, RT-1616HW)	AE
	HDECQ0056AFSB	Cover, APSS Indicator (RT-1616HB)	AE
9	HPNLC3345AFSA	Front Panel (RT-1616H, RT-1616HW)	**
	HPNLC3345AFSB	Front Panel (RT-1616HB)	**
10	JKNBK0169AFSA	Knob, Record Level Control, Right Channel (RT-1616H, RT-1616HW)	AH
	JKNBK0169AFSC	Knob, Record Level Control, Right Channel (RT-1616HB)	**
11	JKNBM1004SESF	Knob, Power Switch/Input Selector Switch/Dolby NR Switch/Bias Selector Switch/ Equalizer Selector Switch (RT-1616H, RT-1616HW)	AE
	JKNBM1004SESI	Knob, Power Switch/Input Selector Switch/Dolby NR Switch/Bias Selector Switch/ Equalizer Selector Switch (RT-1616HB)	AE

** ; Price will be quoted upon receipt of order.

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
12	JKNBN0366AFSA	Knob, Record Level Control, Left Channel (RT-1616H, RT-1616HW)	AH
	JKNBN0366AFSD	Knob, Record Level Control, Left Channel (RT-1616HB)	**
13	JKNBR0110AFSE	Key, Pause/Rewind/Reverse APSS/Play/Fast Forward/ Forward APSS/Stop (RT-1616H, RT-1616HW)	AG
	JKNBR0110AFSA	Key, Pause/Rewind/Reverse APSS/Play/Fast Forward/ Forward APSS/Stop (RT-1616HB)	AC
14	JKNBR0110AFSF	Key, Record (RT-1616H, RT-1616HW)	AG
	JKNBR0110AFSB	Key, Record (RT-1616HB)	AD
15	JKNBP0076AFSC	Button, Cassette Chamber Lid Opener (RT-1616H, RT-1616HW)	**
	JKNBP0076AFSD	Button, Cassette Chamber Lid Opener (RT-1616HB)	**
16	KCOUB0072AFZZ	Digital Tape Counter	AL
17	LANGA0060AFFW	Lever, Record Safety	**
18	LANGF0400AFFW	Bracket, Flywheel	**
19	LANGF0441AFFW	Bracket, Motor	**
20	LANGF0442AFFW	Bracket, Pause Killer Spring	**
21	LANGF0444AFZZ	Bracket, Printed Wiring Board	**
22	LANGF0448AFZZ	Bracket, Printed Wiring Board	**
23	LANGH0110AFZZ	Bracket, Front Frame	AA
24	LANGJ0052AFZZ	Bracket, Right Hand Side	AD
25	LANGJ0055AFZZ	Bracket, Left Hand Side	AE
26	LANGK0187AFFF	Lever, Cassette Retaining	**
27	LANGQ0587AFZZ	Bracket, Record Level Control	AA
28	LANGR0404AFZZ	Bracket, Transformer	AH
29	LANGT0732AFSA	Rear Panel	**
30	LANGT0694AFZZ	Bracket, Cassette Chamber Lid Opener	AE
31	LANGT0751AFZZ	Bracket, Mechanism Chassis	**
32	LBSHC0002AGZZ	Bushing, Mains Supply Cord (RT-1616H)	AB
	LBSHC0004AGZZ	Bushing, Mains Supply Cord (RT-1616H, RT-1616HB)	AC
	LBSHC0007AFZZ	Bushing, Mains Supply Cord	AB
33	LBSHS0001AG00	Cushion, Motor	AA
34	LBSHZ0054AFZZ	Retainer, Cam Follower	**
35	LCHSM0299AFZZ	Mechanism Chassis	–
36	LCHSS0124AFZZ	Mechanism Sub-chassis	–
37	LCHSZ0063AFSA	Frame, Front (RT-1616H, RT-1616HW)	–
	LCHSZ0063AFSB	Frame, Front (RT-1616HB)	–
38	LHLDP3053AFFW	Holder, APSS Indicator/Level Meters Illumination Lamp	AA
39	LHLDP8060AF00	Holder, Tape Illumination Lamp	AC
40	LHLDW1075AFZZ	Holder, Wire Lead	AA
41	LHLDW1067AFZZ	Holder, Wire Lead, 60mm	AA
42	LHLDW1068AFZZ	Holder, Wire Lead, 100mm	AA
43	LHLDW1070AFZZ	Holder, Heads Lead	AB
44	LHLDW9003CEZZ	Holder, Wire Lead	AA
45	LPINB0051AFFW	Pin, Solenoid	**
46	LSLVM0073AFFW	Sleeve, Solenoid Interlocking Lever	**
47	LSTPF0052AFFW	Bracket, Operation Lever Shaft	AB
48	LSTWC2001AFZZ	Stop Ring, 2 mm Dia.	–
49	LSTWC3002AFZZ	Stop Ring, 3 mm Dia.	–
50	LSTWC4004AFZZ	Stop Ring, 4 mm Dia.	–
51	LX-BZ0214AFZZ	Screw, Flywheel Thrust Adjust	AB
52	LX-BZ0219AFFD	Screw, Motor Retaining	AA
53	LX-HZ0056AFFD	Screw, With Washer, 3 mm Dia. x 10 mm	–
54	LX-WZ5018AGZZ	Washer, 2.1 mm Dia. x 4 mm Dia. x 0.25 mm	AA
55	LX-WZ5020AGZZ	Washer, 1.7 mm Dia. x 3.2 mm Dia. x 0.25 mm	AA
56	LX-WZ5037AGZZ	Washer, Flywheel Thrust	AA
57	LX-WZ9053AFZZ	Washer, Oil Cut	AA
58	MLEVF0729AFZZ	Lever, Record/Playback Operation	AE
59	MLEVF0732AFFW	Lever, Record Interlocking	AD
60	MLEVF0733AFFW	Lever, Pause Interlocking Lever Lock	AC
61	MLEVF0735AFFW	Lever, Solenoid Interlocking	AC
62	MLEVF0737AFFW	Lever, Fast Forward Roller	AD
63	MLEVF0738AFFW	Lever, Record Interlocking Lever Safety	AC
64	MLEVF0847AFZZ	Lever, Pause Interlocking	**
65	MLEVF0740AFZZ	Lever, Fast Forward/Rewind Lever Lock	AG
66	MLEVF0741AFZZ	Lever, Play Key Lock	AF
67	MLEVF0746AFZZ	Lever, Cassette Chamber Lid Opener Button	AB
68	MLEVF0797AFZZ	Lever, Power Switch Interlocking	AB
69	MLEVF0798AFZZ	Lever, Record/Playback Switch Interlocking	AD
70	MLEVF0799AFZZ	Lever, Record/Playback Switch Interlocking	AB
71	MLEVF0826AFZZ	Lever, Pause Killer	**
72	MLEVF0827AFZZ	Lever, Fast Forward/Rewind Operating	**
73	MLEVF0828AFZZ	Lever, Auto Stop Switch	**
74	MLEVP0078AF00	Tip, Cassette Retaining Spring	AB
75	MLEVP0086AFZZ	Lever, Brake Pressure	AB
76	MLEVP0087AFZZ	Lever, Record Safety	AC
77	MLEVP0089AFZZ	Lever, Take-up Idler Interlocking	AB
78	MLEVP0091AFZZ	Lever, Take-up Idler	AC
79	MLEVP0092AFZZ	Lever, Solenoid Interlocking	AC
80	MLEVP0094AFZZ	Lever, Brake	AB
81	MLEVP0096AFZZ	Lever, Cassette Chamber Lid Opener	AD
82	MLEVP0110AFZZ	Lever, Sensor	**
83	MLOKC0058AF00	Lever, Cassette Chamber Lid Opener Lever Lock	AD
84	MRODM0058AFFD	Rod, Take-up Idler Lever Interlocking	AB
85	MSPRC0031AGMN	Spring, Record/Playback Head Azimuth	AA
86	MSPRC0123AFFJ	Spring, Solenoid	AA
87	MSPRC0143AFFJ	Spring, Cassette Chamber Lid Opener Lever	AA
88	MSPRD0136AFFJ	Spring, Cassette Retaining	AB
89	MSPRD0161AFFJ	Spring, Pressure Roller	AB
90	MSPRD0164AFFJ	Spring, Pause Operating Lever Lock Lever	AA
91	MSPRD0163AFFP	Spring, Brake Pressure Lever	**
92	MSPRD0196AFFJ	Spring, Sensor	**
93	MSPRP0156AFFJ	Spring, Operating Lever	AE
94	MSPRP0157AFFJ	Spring, Sub-chassis Retaining	AC
95	MSPRP0163AFFJ	Spring, Cassette Retaining	AB
96	MSPRT0384AFFJ	Spring, Record/Playback Switch Interlocking Lever	AA
97	MSPRT0463AFFJ	Spring, Record Safety Lever	AA

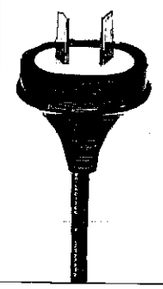
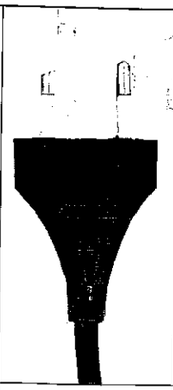
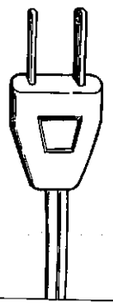
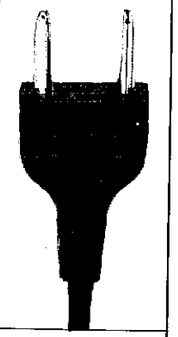
PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
98	MSPRT0464AFFJ	Spring, Take-up Idler	AA
99	MSPRT0465AFFJ	Spring, Over Stroke Absorber	AA
100	MSPRT0467AFFJ	Spring, Record Interlocking Lever	AA
101	MSPRT0470AFFJ	Spring, Play Key Lock Lever	AA
102	MSPRT0471AFFJ	Spring, Fast Forward/Rewind Operating Roller	AA
103	MSPRT0472AFFJ	Spring, Fast Forward/Rewind Operating Roller	AA
104	MSPRT0480AFFJ	Spring, Cassette Chamber Lid Opener Lock Lever	AA
105	MSPRT0481AFFJ	Spring, Cassette Chamber Lid Opener Lever	AA
106	MSPRT0506AFFJ	Spring, Record/Playback Interlocking Lever	AA
107	MSPRT0509AFFJ	Spring, Fast Forward/Rewind Lever Lock Lever	AA
108	MSPRT0517AFFJ	Spring, Solenoid Interlocking Lever	AA
109	MSPRT0518AFFJ	Spring, Record Interlocking Lever	AA
110	MSPRT0525AFFJ	Spring, Record Interlocking Lever Safety Lever	AB
111	MSPRT0530AFFJ	Spring, Record/Playback Switch	AA
112	MSPRT0531AFFJ	Spring, Record/Playback Switch Interlocking Lever	AA
113	MSPRT0546AFFJ	Spring, Take-up Idler Lever	**
114	MSPRT0565AFFJ	Spring, Pause Killer Lever	**
115	NBALS0004AGFJ	Steel Ball, 3 mm Dia.	AA
116	NBLTH0057AFZZ	Belt, Mechanism Drive	AD
117	NBLTK0129AFZZ	Belt, Tape Counter Drive	**
118	NBLTK0130AFZZ	Belt, Auto Stop Mechanism	**
119	NBRGC0059AFZZ	Bearing, Capstan	AG
120	NDAIR0121AFSA	Turntable, Take-up	AG
121	NDAIR0122AFSA	Turntable, Supply	AE
122	NDRM-0153AFZZ	Worm Wheel, Auto Stop Mechanism	**
123	NFLYC0068AFZZ	Flywheel	AT
124	NIDR-0057AFZZ	Idler, Take-up	AF
125	NPLYR0050AFZZ	Pulley, Take-up, Rubber	AB
126	NPLYR0060AFZZ	Worm, Atuo Stop Mechanism	**
127	NPLYR0061AFZZ	Pulley, Auto Stop Mechanism	AE
128	NROLW0004AFZZ	Roller, Fast Forward/Rewind Operating	AK
129	NROLX0003AFZZ	Gear, Rewind	AB
130	NROLY0023AFZZ	Lever, Pressure Roller	**
131	NSFTN0006AFFW	Shaft, Worm Wheel	**
132	NSFTT0105AFFP	Shaft, Function Key	AE
133	NSFTZ0058AFFD	Shaft, Cassette Retaining Lever	AB
134	PCOVW9105AFZZ	Cover, Transformer Lead Wire	AG
135	PCUSG0062AF00	Cushion, Rubber, Sub-chassis Shock Absorb	AA
136	PCUSG0078AF00	Cushion, Rubber, Operating Lever Shock Absorb	AC
137	PCUSG0079AF00	Cushion, Rubber, Play Lever Lock Lever Shock Absorb	AB
138	PCUSG0086AF00	Rubber, Brake Lever	AB
139	PCUSS0096AFZZ	Cushion, 10 mm x 20 mm x 6 mm	AA
140	PFLT-0276AFZZ	Leg, Felt	AA
141	PFLT-0329AF00	Felt, Fast Forward/Rewind Lever	AA
142	PGIDM0064AFZZ	Guide, Cam Follower	**
143	PGUMM0104AF00	Cushion, 3 mm x 8 mm x 2 mm	AA
144	PGUMS0103AF00	Cushion, Rubber, 2 mm x 8 mm x 0.8 mm	AA
145	PGUMS0115AF00	Cushion, 4.5 mm x 7 mm x 1.2 mm	AA
146	PRDAR0130AFZZ	Heat Sink, Transistor	AB
147	PSPAB0103AFFW	Spacer, Voltage Selector	AA
148	PSPAI0131AFZZ	Spacer, Fiber, 15.5 mm Dia. x 2 mm	AA
149	PSPAS0067AFZZ	Spacer, Record Indicator/ Dolby NR Indicator	AA
150	PSPAS0068AFZZ	Spacer, Peak Level Indicator	AA
151	PZETV0006CE00	Insulator	AA
152	PZETV0007TAZZ	Cover, Tip	AA
153	QACCB0052AF09	Mains Supply Cord, BEAB Safety Standard, without Plug (RT-1616H)	AM
	QACCL0001AFZZ	Mains Supply Cord, SAA Safety Standard, with Plug (RT-1616H, RT-1616HB)	AR
	QACCV0001AGZZ	Mains Supply Cord, VDE Safety Standard, with Plug (RT-1616H, RT-1616HB)	AP
	QACCZ0002TA0F	Mains Supply Cord, with Plug (RT-1616HW)	AF
	QACCZ0053AF00	Mains Supply Cord, with Plug (RT-1616HW)	AK
PG2	QCNCM175FAFZZ	Plug, 6 Pin	AC
PG1	QCNCM178JAFZZ	Plug, 9 Pin	AC
SO2	QCNCW146FAFZZ	Socket, 6 Pin	AB
SO1	QCNCW149JAFZZ	Socket, 9 Pin	AB
	QCNW-0117AFZZ	Connecting Cord (RCA Type) (RT-1616HW)	AL
	QCNW-0139AFZZ	Connecting Cord (DIN Type) (RT-1616H, RT-1616HB)	AS
F502, F503, F504	QFS-C631CAGNI	Fuse, 630mAT	AE
F501	QFS-C800CAGNI	Fuse, 80mAT	AG
154	QFSHD1001AGZZ	Holder, Fuse	AB
J4	QJAKJ0055AFZZ	Jack, Headphones	AE
J1, J2	QJAKZ0062AFZZ	Jack, Microphones	AE
155	QLUGP0111CEFW	Lug Terminal, Printed Wiring Board	AA
156	QLUGP0150AFZZ	Lug Terminal, Printed Wiring Board	AA
157	QLUGP9050AFFW	Lug Terminal, Printed Wiring Board	AA
158	QPWBF0726AFA1	Printed Wiring Board, Record/ Playback Amp. (Printed Wiring Board only)	N.A.
159	QPWBF0726AFA2	Printed Wiring Board, Level Meters (Printed Wiring Board only)	N.A.
160	QPWBF0726AFA3	Printed Wiring Board, Power Switch (Printed Wiring Board only)	N.A.
161	QPWBF0739AFZZ	Printed Wiring Board, Mechanism (Printed Wiring Board only)	N.A.
SO501	QSOCE0410AGZZ	Voltage Selector	AH
J3 (A~E)	QSOCZ2463AFZZ	J3A, J3B: Line Input Jacks J3C, J3D: Line Output Jacks J3E: Record/Playback Socket	AK

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	CODE
SW9	QSW-F0116AFZZ	Switch, Bias	AE
SW2, SW3, SW4, SW5	QSW-P0138AFZZ	SW2(A–D): Switch, Equalizer Selector SW3(A–D): Switch, Bias Selector SW4(A–D): Switch, Input Selector SW5(A–D): Switch, Dolby NR	AQ
SW8	QSW-P0158AFZZ	Switch, Power	AM
SW6 (A–D)	QSW-S0185AFZZ	Switch, Play Key Interlocking	AG
SW1 (A–L)	QSW-S0187AFZZ	Switch, Record/Playback	AH
SW7 (A–D)	QSW-S0210AFZZ	Switch, Fast Forward/Rewind Key Interlocking	AF
SW10	QSW-S0223AFZZ	Switch, Auto Stop	AD
162	QTANZ0160AFZZ	Lug Terminal, Mains Supply Cord Connecting	AA
163	QTIPF0001CEYW	Tip, Wire Lead	AA
164	QTIPZ0058AFZZ	Tip, Plug	AA
165	RHEDA0059AFZZ	Head, Erase	AK
166	RHEDH0068AFZZ	Head, Record/Playback	**
PL4	RLMPM0060AFZZ	Pilot Lamp, APSS Indicator (12V/75mA)	AC
PL3	RLMPM0082AFZZ	Pilot Lamp, Tape Illumination (12V/75mA)	AD
PL1, PL2	RLMPM0087AFZZ	Pilot Lamp, Meter Illumination (12V/75mA)	**
167	RMOTP0054AFZZ	Motor	**
ME101, ME201	RMTRL0176AFZZ	Level Meter	**
SOL401	RPLU-0071AFZZ	Solenoid	AR
	SPAKA0544AFZZ	Cushion, Packing (RT-1616H, RT-1616HB)	**
	SPAKA0559AFZZ	Cushion, Packing (RT-1616HW)	**
	SPAKC1203AFZZ	Individual Carton (RT-1616H)	**
	SPAKC1204AFZZ	Individual Carton (RT-1616HB)	**
	SPAKC1205AFZZ	Individual Carton (RT-1616HW	**
	SPAKX0192AFZZ	Pad, Packing, Cassette Chamber Lid	**
	SSAKA0024AFZZ	Sack, Operation Manual	AA
	SSAKH0054AGZZ	Sack, Unit	AB
	TCAUH0056AGZZ	Caution Sheet, Mains Supply Cord (for Users in UK) (RT-1616H)	–
	TCAUZ0039AFZZ	Caution Sheet, Unit Sack (for Users in UK) (RT-1616H)	–
	TCTLE0001AGZZ	Catalog, for Users in UK (RT-1616H)	–
	TGANE1117AFZZ	Warranty Card, for Users in UK (RT-1616H)	–
	TGANE1118AFZZ	Warranty Card, for Users in Australia (RT-1616H, RT-1616HB)	–
	TGANE1121AFZZ	Warranty Card, for PX (RT-1616HW)	–
	TGANG1039AFZZ	Warranty Card, for Users in Europe (RT-1616H, RT-1616HB)	–
	TINSL0137AFZZ	Operation Manual, English/German/French	**
	TINSZ0137AFZZ	Operation Manual, Spanish (RT-1616HW)	**
	TINSZ0151AFZZ	Operation Manual, Swedish (RT-1616H, RT-1616HB)	**
	TLABJ0006AFZZ	Label, MADE IN JAPAN (RT-1616H, RT-1616HW)	–
	TLABS0004AGZZ	Label, SEV Safety Standard (RT-1616H, RT-1616HB)	–
	TLABS0016AGZZ	Label, SEMKO/NEMKO Safety Standard (RT-1616H, RT-1616HB)	–
	TLABS0054AFZZ	Label, BEAB Safety Standard (RT-1616H)	–
	TLABS0063AFZZ	Label, DEMKO Safety Standard (RT-1616H, RT-1616HB)	–
	TLABS0076AFZZ	Label, Funk- (RT-1616H, RT-1616HB)	–
	TLSTS0001ZZR0	Service Station List, For Users in Australia (RT-1616H, RT-1616HB)	–
	TMAPC0537AFZZ	Schematic Diagram	–
	TSPC-0530AFZZ	Label, Specifications (RT-1616H)	–
	TSPC-0531AFZZ	Label, Specifications (RT-1616HB)	–
	TSPC-0532AFZZ	Label, Specifications (RT-1616HW)	–
	TTAGH0057AFZZ	Tag, English/German/French (RT-1616H, RT-1616HB)	**
168	LX-WZ3054AFFD	Lockwasher, External	AA
169	LX-WZ5013AGZZ	Washer, 2.1mm Dia. x 4mm Dia. x 0.13mm	**
170	LX-WZ3017CEFN	Lockwasher, External	**
171	MSPRP0202AFFJ	Spring, Brake	**
172	PGUMM0111AF00	Rubber, Brake Spring	AB
173	LANGJ0071AFZZ	Bracket, Cabinet Retaining, Right Hand Side	**
174	LANGJ0072AFZZ	Bracket, Cabinet Retaining, Left Hand Side	**
175	LANGQ0617AFFW	Bracket, Motor Printed Wiring Board	**
176	MLEVF0885AFZZ	Lever, Rewind	**
177	MSPRT0477AFFJ	Spring, Rewind Lever	**

TABLE 1 MAINS SUPPLY CORD WIRING CONNECTIONS

Mains supply cord	Bushing	Connection		Safety standard	Photograph or figure
		L (A)	N (B)		
QACCB0052AF09 (RT-1616H)	LBSHC0002AGZZ	Brown	Blue	BEAB	
QACCL0001AFZZ (RT-1616H and RT-1616HB)	LBSHC0007AFZZ	Brand stamp	Projection stripe	SAA	
QACCV0001AGZZ (RT-1616H and RT-1616HB)	LBSHC0004AGZZ	Brown (Blue)	Light blue (Black)	VDE	
QACCZ0002TA0F (RT-1616HW)	LBSHC0007AFZZ	Brown	Brown	———	
QACCZ0053AF00 (RT-1616HW)	LBSHC0007AFZZ	Black	Black	———	

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